THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. VIII. No. 175—11th YEAR.] LONDON, JULY 5, 1859. [Subscription per Ann. { 15s. in Advance / 18s Credit.] Price 8d. Unstamped.

TO GAS COMPANIES.

FIRE-CLAY Retorts and Fire Goods.

The Advertiser has brought his Fire-Clay Retorts to great perfection, both as to quality and finish. Many have stood three and four years.

Every description of Fire Goods in any quantity always on hand. The Fire Clay is the very best in the North of England. Stock never less than 10,000 tons weathering.

Orders promptly executed.

Apply, G. H. RAMSAY, of Derwenthaugh Fire-Brick Works, near NEWCASTLE-ON-TYNE.

Aug. 22, 1856.

WATER-WORKS.

CONTRACT No. 5.

TO BRASSFOUNDERS AND OTHERS.

THE Local Board of Health for the district of Wallasey, in the county of Chester, do hereby give notice that they are prepared to receive TENDERS from parties willing to undertake the following named Contract:—

Contract No. 5. For the SUPPLY of SLUICE VALVES, HYDRANTS, and other STREET FITTINGS.

Duplicate Specifications, forms of Tender, and schedules of prices may be obtained on payment of 10s., on application to JAMES T. LEA, Resident Engineer, at the Offices of the Local Board, or at the Office of ROBERT RAWLINSON, Civil Engineer, No. 34, Parliament Street, WESTMINSTER, on and after Monday, the 4th of July next, between the hours of Ten a.m. and Three p.m.

The Contractor will be required to enter into a bond, with two approved sureties, for the due performance of the contract, which contract and bond will be prepared at the expense of the Contractor.

Sealed Tenders to be delivered at the Public Offices, EGREMONT, near BIRKENHEAD (law-clerk's office), on or before Four o'clock in the afternoon of Wednesday, the 20th of July next, endorsed "Tender for Contract No. 5, Water-Works."

No Tender will be entertained unless made in the prescribed form, and the Board do not bind themselves to accept the lowest or any Tender.

By order,
T. K. HASSALL, Clerk to the said Board.
Public Offices, Egremont, near Birkenhead,
June 28, 1859.

KINSON FIRE BRICKS are indestructible by heat, and are warranted to last twice as long as Stourbridge, Newcastle, or Welsh bricks. 80s. per 1000 at Nine Elms Station.

WORKS: POOLE, DORSET.

THE Directors of the Bilston Gaslight and COKE COMPANY are prepared to receive TENDERS for the undermentioned CAST-IRON SPIGOTT and SOCKET PIPES, to be delivered, carriage free, to the Trenches, or by railway to Bilston Station:—

2250 yards of 8-inch pipes. Weight per yard 126lbs., 750 pipes.

780 yards of 5-inch pipes. Weight per yard 70lbs., 260 pipes.

Tenders to be sent in on or before the 14th of July next, stating price per ton, addressed "To the Chairman of the Bilston Gaslight and Coke Company."

The pipes to be cast of an equal thickness throughout, and warranted sound under a pressure of 250lbs. on the inch.

For further information apply to Mr. JOHN MUDIE, Resident Engineer, Gas-Works, Moxley, WEDNESBURY.

The Directors do not pledge themselves to accept the lowest or any of the Tenders.

By order of the Board.
JOB SMITH LESTER, Clerk.
Gas-Works, Moxley, Wednesbury,
June 24, 1859.

TO GAS-WORK MANAGERS.

WANTED, a Man to take the MANAGEMENT of a small Gas-Work, where the whole of the duties will have to be performed by the person appointed.

All applicants must have filled a similar situation, and their letters must be accompanied with references and age. The wages will be 22s. per week, if capable of Gas Fitting. A labourer will be employed to assist in stoking, &c.

Address N. MOFFATT, Berkeley, GLOSTERSHIRE, where a small GAS APPARATUS, capable of supplying 30 lights, with portable Iron Tank and Gasometer, all complete, may be bought a bargain.

Also an APPARATUS for 10 lights, which the owner has no further use for, may be had on advantageous terms.

COWEN'S PATENT FIRE-CLAY RETORTS.

JOSEPH COWEN and CO.,
BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,

Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS RETORTS and OTHER OBJECTS in FIRE CLAY."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire Bricks, and every other article in Fire Clay, are promptly executed at their Works as above.

COWEN'S GARESFIELD COAL AND COKE.

Coal and Coke Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.

FIRST PRIZE IN THE PARIS EXHIBITION.

JOHN RUSSELL AND CO.,
THE OLD TUBE WORKS,
CHURCH HILL, WEDNESBURY;
ALMA WORKS,
WALSALL, STAFFORDSHIRE;
and 69, UPPER THAMES STREET, LONDON,

Original Manufacturers of Wrought-Iron Gas Tubes, and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Steam Boilers.

J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water, and the largest Orders may be executed in a few days.

Gun Metal, and all other kinds of Cocks, Stocks, Dies, and Taps, Galvanised Tubes, &c.

N.B. All Goods thoroughly Tested before sent out, and Warranted.

TO ENGINEERS AND CONTRACTORS.

THE Directors of the Luton Gas Com- PANY are willing to receive TENDERS for the ENLARGEMENT of their RETORT-HOUSE; also for the erection of Retorts therein, with all the requisite Fittings, Connexions, Hydraulic Main, &c., and for other work.

Plans and Specifications of the whole may be seen at the Company's Office, Luton, on and after Monday, July 10.

Tenders to be addressed under cover "To the Directors of the Gas Company, Luton, BEDFORDSHIRE." No Tender will be received after Wednesday, July 20, and the Directors do not pledge themselves to accept the lowest or any Tender.

THE Uxbridge and Hillingdon Gas CONSUMERS' COMPANY are desirous to LET their Works. Full particulars may be obtained of the SECRETARY, Mr. W. GARDINER, Solicitor, UXBRIDGE; or of Mr. ALFRED PENNY, Engineer, Wharf Road, City Road, LONDON. Tenders to be sent to Mr. GARDINER, UXBRIDGE, on or before the 21st of July.

The Company do not bind themselves to accept the lowest or any Tender.

Uxbridge, June 29, 1859.

EIGHTON MOOR GAS COALS.—Parties wishing to be supplied with these first-class Gas Coals will please to apply to Mr. MATTHEW NESBIT, EIGHTON MOOR OFFICE, NEWCASTLE-UPON-TYNE. These coals are well known as among the richest in gas, and working the roundest on the River Tyne. They are extensively used by metropolitan gas works.

WANTED, either at home or abroad, a Situation as MANAGER to a small Gas-Work, or as WORKING FOREMAN, by a man who has had sixteen years' practical experience in the erection and management of Gas-Works; is also a good Fitter.

Address to L. L., Post-Office, Wokingham, BERKS.

TO GAS COMPANIES.

WANTED, a Situation to Inspect, Repair, or Re-construct Meters, Wet or Dry; is acquainted with Fittings and the general work of a Gas-Work. Unexceptionable Testimonials. A preference given to the country.

Address A. B., at Mr. WHITE'S, Gas-Fitter, No. 41, York Road, Lambeth, SURREY.

BLAYDON BURN AND LOW BENWELL FIRE-CLAY RETORT AND FIRE-BRICK WORKS, NEAR NEWCASTLE-ON-TYNE.

WILLIAM COCHRAN CARR begs most respectfully to thank the Metropolitan, Provincial, and Continental Gas Companies for their patronage for several years past, and to intimate that he has rebuilt and enlarged his extensive premises for the Manufacture of CLAY RETORTS; and that he is now prepared to execute the largest orders with punctuality and despatch. Orders for FIRE-CLAY RETORTS, of all shapes and sizes, FIRE-BRICKS, and all other Articles in Fire-Clay, executed on the shortest notice, and on the most reasonable terms.

London Agents:
JAMES LAWRIE & CO.,
63, OLD BROAD STREET, CITY, LONDON.

MR. JOHN HODGSON JONES,
CIVIL ENGINEER,
Has removed his Offices from 1, Poet's Corner, to 26, GREAT GEORGE STREET, WESTMINSTER, S.W.

CHARLES BOTTEN and SON,
ENGINEERS & METER-MAKERS,
CRAWFORD PASSAGE, RAY STREET,
CLERKENWELL, LONDON (E. C.).

Manufacturers of Station and Patent Protector Consumers' Meters, Patent Slide-Valves, Gas-Fittings, Pipes, &c.

Also, High-pressure Cocks, Hydrants, Closets, and all Water-Fittings.

PURIFIERS AND STEAM ENGINE.

THE Directors of the Boston Gas Com- PANY desire to receive TENDERS for four DRY-LIME PURIFIERS, 9 feet square, with Centre Valve; also a six-horse power STEAM ENGINE.

Plans and Specification for Purifiers may be seen at the Gas-Works, BOSTON, and at the Office of the Company's Engineer, Gas-Works, Richmond, SURREY, on and after Monday the 27th inst. Tenders to be delivered on or before Monday the 4th of July, addressed to F. T. WHITE, Esq., Solicitor, BOSTON.

The Directors do not bind themselves to receive the lowest or any Tender.

R. P. SPICE, Engineer.

Richmond, June 20, 1859.

WANTED, a competent Workman to Repair and Re-construct Gas-Meters.

Application to be made to the MANAGER, enclosing testimony to character and skill.

Gas-Works, Stoke-upon-Trent, Staffordshire,
June 25, 1859.

WANTED, a Situation as Manager of a Country Gas-Work, by the Advertiser, who has had fifteen years' experience in the erection and management of Gas-Works. Satisfactory references and Testimonials as to character and abilities.

Address R. N., care of Mr. KING, 11, Bolt Court, Fleet Street, LONDON.

FIRE BRICKS.

THE MACHEN COLLIERY COMPANY, NEWPORT (MON.).

Shippers of Fire-Goods of First-class quality manufactured from a remarkably pure seam of Fire-Clay.

Railway Communication by Broad or Narrow Gauge with all parts of the Kingdom, and by Seaboard, Coastwise, and Foreign.

WILLIAM STEPHENSON & SONS,
THROCKLEY,
NEWCASTLE-ON-TYNE,
MANUFACTURERS OF EVERY DESCRIPTION OF
FIRE BRICKS, CLAY RETORTS, LUMPS, TILES,
&c. &c.

LONDON OFFICES:
76, KING WILLIAM STREET, CITY.

A large stock of Fire-Clay Goods always on hand in London, at the lowest wharf prices, at Messrs. CHRISTIX & Co.'s Wharf, 64, Bankside, SOUTHWARK.

JOHN ROGERSON and CO.,
NEWCASTLE-ON-TYNE & MIDDLESBRO'-ON-TEES.

Wrought and Cast Iron Pipes, Cast-Iron Retorts, and all kinds of Foundry Work necessary for Gas-Works. Fire-Bricks and Clay Retorts. Gas Coals of every description. Pig, Bar, and Plate Iron.

MEDALS AWARDED TO
THOMAS GLOVER'S
PATENT DRY GAS-METERS.

THOMAS GLOVER,

PATENT DRY GAS-METER MANUFACTURER,

SUFFOLK STREET, CLERKENWELL GREEN, AND
ALLEN STREET, GOSWELL STREET, E.C.

LONDON, March 25, 1859.

THOMAS GLOVER takes this opportunity of thanking Gas Companies and his other Customers for the very liberal support and patronage he has received during the past year, which has far exceeded his most sanguine anticipations, having sold a greater number of his PATENT DRY GAS-METERS since the dissolution of his partnership with Mr. Croll than he was ever previously enabled to do in any one year.

THOMAS GLOVER confines his sole attention to the business of Gas-Meter Making. The propriety of his doing so is satisfactorily proved by his success; and, without the practice of any quackery, or any attempt to delude the public by an absurd exhibition of "Old and New Valves," his Meters are in general use by the Metropolitan Gas and other Companies in this Country and abroad. For example, one Metropolitan Company have now in use above **12,500** of his Patent Dry Gas-Meters; some of these Meters have been fixed for Fourteen Years, and are still in working order, without complaint from either the Company or the Consumer.

THOMAS GLOVER thinks it necessary to put Gas Companies on their guard against parties selling Patent Dry Gas-Meters constructed in imitation of his, but unskilfully made on erroneous principles, and with improper and unsuitable materials.

THOMAS GLOVER'S Workshops are now the most extensive in this or any other Country, and he is thereby enabled promptly to execute orders to any extent required. Purchasers may at any time inspect his Works and the Materials of which his Meters are constructed. He is ready to enter into Contracts with Gas Companies and others to uphold their Stock of his Meters for Twenty Years at an annual charge varying from 2½ to 5 per cent., and to leave always in the hands of Gas Companies Three Years' charge for upholding, as a guarantee for the fulfilment of the Contract.

CROSLEY & GOLDSMITH'S

PATENT SELF-ADJUSTING & COMPENSATING GAS-METERS

CANNOT BE OVER OR UNDERCHARGED WITH WATER,

and they consequently register the quantity of Gas consumed with greater accuracy than Meters in which the Water-Line is variable.

MANUFACTURED BY

CROSLEY & CO.,

GAS-METER MANUFACTURERS,

103, SOUTHWARK BRIDGE ROAD, LONDON.

N.B. The Patent Self-Adjusting and Compensating Apparatus may be applied to the ordinary Meter.

Manufacturers of LOWE'S PATENT MOTIVE-POWER METER, for situations where there is an inadequacy of pressure to supply the special requirements of certain consumers in low grounds during the day or night.

Also, Manufacturers of EXPERIMENT METERS, GASHOLDERS, GOVERNORS, MINUTE-CLOCKS, PHOTOMETERS, &c. &c., similar to those used by Mr. King, of Liverpool.

EXTRACT FROM THE REPORT OF MESSRS. LOWE, KIRKHAM, PEARSE, AND BARLOW, ON CROSLEY AND GOLDSMITH'S PATENT METERS.

Our experiments lead us to the conclusion that the patent meter is a practical and substantial improvement upon the ordinary wet gas-meter, inasmuch as the capacity of the measuring chamber is not diminished by an excessive supply of water, nor can it be increased by drawing off water. On the one hand, therefore, the consumer is protected against any intentional or negligent overfilling of the meter, the result of which is to exaggerate the registered quantity of gas actually consumed; and, on the other hand, the gas manufacturer is protected against the fraudulent abstraction of water by the consumer, the effect of which in the ordinary meter is to cause it to register less gas than is really supplied. Time alone can determine whether these advantages are gained at the expense of its durability, or by any complexity which may render its utility doubtful; but, so far as we are able to form an opinion upon these points, the patent meters are not liable to any greater derangement than the ordinary wet meters, nor do we believe they will be less durable.

(Signed) GEORGE LOWE, *C.E., F.R.S., Engineer-in-Chief to the Chartered Gas Company.*
JOHN KIRKHAM, *C.E., late Engineer-in-Chief of the Imperial Gaslight Company.*
GEDDIE PEARSE, *late Engineer-in-Chief to the Incorporated and Provincial British Gaslight Companies.*
THOMAS G. BARLOW, *Civil and Consulting Gas Engineer.*

LICENCES GRANTED TO THE TRADE ON MODERATE TERMS.

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NOTICES.

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All Communications to be addressed to the Editor, No. 42, Parliament Street, Westminster; and orders for Advertisements to the Publisher, Mr. W. B. King, No. 11, Bolt Court, Fleet Street.

THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 5, 1859.

NOTES UPON PASSING EVENTS.

THE documents recently published by the municipal authorities of Liverpool, in reply to the attacks of the flippant dabblers in statistics who follow the inspirations of the Registrar-General, have at any rate furnished matter for serious reflection, even to those who may not entirely agree with the principles adopted by the municipal body in question. As we said in our last number, it seems to us that there is no substantial difference between the theories, or the principles, of government adopted by the respective parties to the dispute, and that they are agreed as to the necessity of an active intervention by the State, or by municipal bodies, in favour of those whom they are pleased to consider as unable to help themselves. The tales which are told of misery and suffering are, indeed, of the saddest description, and were there no probability of discovering a remedy to them through the free exercise of individual energy, and perhaps we should add, of private charity, we ourselves should be amongst the most urgent of the clamourers for public interference. It is, however, because we are convinced that the course, in which the Liverpool authorities are now engaged, will ultimately defeat the object they have in view—viz., the moral and physical advantage of their fellow-citizens—that we venture again to return to the subject, with the hope that even the attempt to examine it will be productive of advantage to the poor, and to society in general. And we do this with a deeper sense of the responsibility of the line of argument we strive to elucidate, from the mere fact that it is impossible to persuade any of the ordinary journals, or any of the so-called "societies for the advancement of Social Science," to admit the discussion of any opinions opposed to those of their favourite authorities. The public can hardly suspect the difficulties which must be overcome, to secure even a hearing, when it is desired to oppose the fashionable theories of the day; or the anxieties which must exist in the mind of a conscientious man, when he finds himself, as it were, alone in the crowd of other reasoners. Yet it would betray a want of moral courage were we to refrain from challenging doctrines which we are convinced are in error, simply from the fear of uttering our warnings in vain; and so we return to the consideration of the great principles involved in the recent Liverpool sanitary operations, and the discussions to which they have given rise, both here and elsewhere.

It seems that at Liverpool the sudden growth of the town, and the absence not only of proper municipal regulations for the construction of houses or laying out streets, but also of correct notions of the proper mode of effecting those objects even among the better classes of proprietors of houses, had superinduced a state of things which was fearful in the extreme. The poorer class of the population were huddled together in lodgings where neither light nor air, cleanliness nor comfort, could be obtained, and where the natural functions of life could not be exercised, simply for want of air and space. It has naturally followed, in this as in all other cases, that the population so depressed was afflicted by mental and moral blights, and that the mortality was as fearful as the criminality was excessive. How ought these evils to have been combated? How could their recurrence be prevented?

The municipal authorities, when the evils had become too glaring to be any longer tampered with, after long discussion have taken upon themselves the general redressing of the wrongs of their poorer fellow-citizens, and they have, in the noblest spirit of charity, provided baths and washhouses; they have secured legislative powers of control over houses built, being, or about to be built; and they have obtained an actual control over the mode of habitation of certain classes of tenements. In all this there is little which is theoretically blameable. It actually had happened that the householders had, from ignorance or design, neglected to perform their duty towards their tenants, and had fostered the sad state of affairs it had become so necessary to remedy. But it seems to us that the direct intervention of the public authorities in these details of private life eventually destroys the feeling of personal responsibility which ought to be felt by both parties to the occupation of house property, and that the active measures adopted at Liverpool to relieve the wants of the poor will result in the destruction of those principles of prudence and forethought amongst the latter, without which the continued prosperity of the nation must cease. Where is the line to be drawn when society takes upon itself to correct the shortcomings of its individual members? and who are to be the judges of the limits to be given to this kind of rude justice? If it be right to interfere with the mode of occupation of houses *built in conformity to the laws existing at the time of their construction*, it must be, at least, as necessary that society should take upon itself to protect the poor against the frauds of the shopkeepers with whom they deal, and to interfere in the relations between master and workman. The extreme Socialists of the Louis Blanc, or of the muscular Christianity schools, are consistent in this respect, but we gravely question whether the members of ordinary municipal corporations would like to see this style of logic applied to the trades by which they themselves live; yet it must be so, if applied at all, and thus ultimately individual action would be destroyed, and society would become a mere lifeless machine, such as was really the case with the old Roman Empire. That marvellously organized despotism, in fact, took upon itself to find food, baths, and amusements for its subjects, and both in theory and in practice (to a great extent) it was a model of parental government; but the consequence of the system thus applied was precisely the one we foresee at the end of the career the Liverpool people are about to enter upon. It did in the course of time destroy the moral worth, as it had destroyed the individual responsibility, of the Roman citizens—just as we fear also the moral worth of the centralized nations of modern times is rapidly being destroyed.

It is worthy of particular remark that at Liverpool, where the experiment of baths and washhouses, under the management of the municipality, has been carried into effect with great skill, and upon a very large scale, those institutions have been found not to be self-supporting. We are, therefore, very much

disposed to say that they ought at once to be put a stop to; or, at least, that a radical change in the method of conducting the business in them ought to be adopted. It always appeared to us that the error of the legislation on this subject consisted in laying down the inflexible rule that there should be a definite proportion of the poorer class of baths, and that the price for those baths should be palpably unremunerative. The proportion and the price ought alike to have been left to the discretion of the local authorities, if it be admitted that the latter were entitled to tax the whole of society for the benefit of one class. But is there not a hardship in making the poor shopkeeper pay rates, in order that the working man, whose pecuniary position is always more stable, and generally more prosperous than his own, should be able to secure comforts and luxuries at less than cost price? In this case, again, do we find that compulsory charity is a practical injustice.

Far be it from us to say that private charity may not be well and properly exercised in providing Baths and Washhouses, in building Model Lodgings, in erecting Drinking Fountains, or in forming Playgrounds for the wretched little Arabs of our streets! They who consecrate their time and their money to the execution of these noble works are indeed benefactors of their race, and they merit all praise and honour! Still it is only on the condition that the sacrifice be individual and spontaneous, that it is likely to be without future evil; and as M. Quetelet, one of the favourite authors of the modern sanitary empirics, very properly observes, "Every institution which substitutes the action of the State for individual prudence, is in the end fatal to society." And so it is likewise, that whilst we are prepared to admit that, *for the future*, both the central and municipal governments are entitled, and bound to issue regulations for the express purpose of preventing the construction of unhealthy dwellings, we are more than disposed to question the right of those bodies to interfere with any existing legal state of things. It is possible, in fact, that some great and pressing suffering may be remedied by a direct intervention in such details of private life, but it can only be at the expense of the permanent interests of society.

What a pity it is that those very influential organs of publicity, the Daily Press, do not engage the services of some competent persons to advise them as to the opinions they express, or the stories they record, upon technical questions. Thus, for instance, the *Daily News* has lately inserted an apparently circumstantial account of the results of the boring operations of the Metropolitan Board of Works; and, amongst other things, it naïvely informs its readers that, at about 50 feet from the surface, a fine bed of yellow clay was found (on the line of the middle level sewer), and that this bed of clay was admirably adapted to receive such a structure. Now, *possibly* there may be a bed of *yellow* clay at the above depth, but we very seriously question the fact, even of an isolated case of this description; and we are convinced that, instead of the word *yellow*, the author of the article we refer to ought to have used the word *blue*. Although this is a great geological blunder, it is not likely to do much mischief; but the Report of the Thames Conservancy Commissioners is a document of more serious importance, and, as such, it ought to have been noticed far more in detail than it has been. Will it be believed that now, when the river Thames is becoming as bad as it was during the past year, in spite of the very copious rainfalls of the last few weeks, the so-called scientific advisers of the Conservators should coolly have dared to assert that the foul state of the river in 1858 was to be attributed exclusively to the fact that one particular storm had swept the accumulations of feculant matters in the sewers into the stream? It would be enough to make Englishmen blush for the scientific departments of the Government, were we not convinced that, in spite of competitive examinations, and all their trumpery, no man of real energy, activity, and ability, would condescend to accept office under our Government as it is at present constituted. Yet there are men, ranking high in the world, who, for the sake of small pay and small consideration, will affect to deal with scientific questions in an official manner; and as our Newspapers seem to be utterly unable to form valid opinions of their merits, the dicta of these self-styled scientific men are taken as truths. It is to this irreflective habit of receiving without question the assertions of official empirics that we may attribute the mischief effected by Mr. Chadwick and his friends; and the Conservators of the Thames appear to be disposed to rival the absurdities of their predecessors.

In the mean time, who is responsible for the sad state of the great artery of our City, and for the disgraceful delays in rendering the Bridges over that stream worthy of the importance of the districts they are supposed to unite? When is Blackfriars Bridge to be repaired, or pulled down? When is the over-puffed Westminster Bridge to exhibit itself for public use and admiration? When are Southwark and Vauxhall, and Putney and Fulham Bridges to be removed, or the frightful Chelsea Aqueduct Bridge made to look respectable? When are the banks of the Thames to be regularized, and its foul mud driven to sea? This is a long series of questions; but, like Anthony, it is to be feared that we shall have to pause very long ere we receive replies to them. Perhaps Sir G. C. Lewis, in his zeal for the cause "of social improvement and progressive reform," may discover some remedy for our present misfortunes. He has the education and the general knowledge requisite for the purpose; but, alas! hitherto Whig reforms have only produced administrative jobbery and official incompetence.

And whilst this subject of Whig reforms is before us, we cannot refrain from calling attention to, and protesting against, a position assumed by Lord Brougham at one of the recent meetings of the Society for the Amendment of the Law. His Lordship then cited, as one of the advantages of the appellate jurisdiction of the House of Lords, that the parties to the suits before them were able to approach the Judges during the progress of the trial; and, in effect at least, he expressed his regret that the etiquette of the Bench precluded the ordinary Judges from obtaining information elsewhere than in Court. We gather from these remarks that the noble Lord would prefer to see our Judges act with the passion and prejudice of the misnamed Judges of foreign tribunals, (who are almost always the counsel for the prosecution in criminal cases, or even in civil cases when there is a suit before them in which the State is interested,) rather than with the dignified impartiality which has almost always honoured our Bench. But, in addition to the danger thus signalized, there is the far greater one of exposing our Judges to seduction and bribery; and, unfortunately, some of the recent legal appointments are not of a nature to make us suppose that this is an imaginary danger. Lord Brougham is, however, consistent in his admiration of the social principles adopted of late years in France, and generally througout the Continent; but we question whether the English public will accept the *Code Napoléon* instead of the "perfection of human reason," as we formerly were accustomed to regard our own common law. If men ought to be reduced to machines in the hands of a strong central government, Lord Brougham and his Benthamite friends may be right; for our part, we think better of humanity, and would prefer seeing it free, but at the same time responsible for its actions.

There have been two rather curious cases before our tribunals of late, to which it may be worth while to call the attention of the manufacturing interests. The first is the trial between Messrs. Doulton and Stiff with respect to the validity of a certain smoke-prevention patent; and it was remarkable principally because the defendant, Mr. Stiff, stated in evidence that "the old Staffordshire kiln, if properly managed, was susceptible of producing all the desired effect of preventing the formation of smoke." Now if this be true, how can Lord Palmerston justify the exemption made in his great title to fame, the Smoke Nuisance Abatement Act, in favour of the potteries of Lambeth? Either Cupid was deceived, or he committed an injustice to favour some political partisan; the latter was, we believe, the true explanation. The second case we refer to was the one in which a Mr. Stephens, an artificial manure manufacturer, of Bow Common, was summoned before the magistrate for having conducted his business, in that out-of-the-way place, so as to be a nuisance to his neighbours. The Bard of Ireland used to sigh for some "bright little world of his own," and it really would seem that those very unpoetical men, the manufacturers of unsavoury things, will soon be compelled to utter the same aspirations, if men's noses and stomachs are to go on increasing in delicacy as they are now doing. Perhaps, after all, the makers of artificial manures would do more wisely in transferring their establishments at once to the small islands on the coast of Holland, where land, fish, and coal are to be had cheaply, and where no neighbours are, than in struggling any longer against the sanitary humbugs of the day. When the latter have destroyed an important branch of industry, they also may discover that by making solitude they do not secure peace.

In the Paris Law Courts there is still pending a case between MM. Chagot et Cie. *v.* Trémeau, which may interest

the proprietors of coal mines, and on that account we feel bound to notice it. According to the 44th article of the law of the 21st of April, 1810, regulating mines in France, if the surface property be endangered by any subterranean mining operations, the parties carrying on the latter are bound to take the said surface property at double its original value. The question which has now arisen is whether this principle ought to apply to house property erected *after* the mining operations had been commenced, and the tribunal has felt it necessary to reserve its decision.

At the Cape we perceive that great suffering on account of the want of water prevailed at the date of the last packet, and that internal communication was almost entirely suspended, because at the roadside inns no means of supplying the horses existed. Surely there must be a sad lack of enterprise or of engineering science in this rising colony, if this be true; for, as we have shown, it is possible to obtain water in situations far more (apparently) unfavourable than in the undulated districts around the Cape. By at once sinking Artesian wells, or by mearly creating artificial reservoirs, it would be possible to place this country beyond danger from droughts, and most earnestly do we recommend the colonists to cause the whole of this hydrological question to be studied by competent persons. It is curious, we would add, that precisely at the time that the inhabitants of South Africa are thus complaining of the want of water, the dwellers in the new State of Minnesota, in North America, are complaining of the ravages produced by the inundations of the affluents of the Mississippi. The doctrine of averages, we fear, will offer but small consolation to either of these great bodies of sufferers, and under any circumstances it would be wiser to attempt to discover the laws which produce the various phenomena connected with the distribution of atmospheric vapour, than to suggest consolation for its absence or its excess. We in Europe are equally concerned in the matter, for of late years the rivers of the north-western parts of our continent have suffered greatly from the same causes; and even at the present day the hydrological conditions of such rivers as the Thames, Scheldt, Rhine, Meuse, Seine, Loire, Rhone, &c., are such as to inspire serious anxiety to those who follow attentively the changes which are always taking place in physical geography.

We have received, at too late a period for a proper notice, a copy of the report of the referees on the the pumping-engines to be used by the Metropolitan Board of Works for raising the waters of the low-level sewers. This is a subject of far too great importance to be treated subsidiarily, and we will therefore examine it hereafter at length.

Circular to Gas Companies.

A RECENT number of *Le Gaz* contains the project of a decree sketched by M. Durand for the regulation of gas-meters in a country where laws are enacted and unmade by a single movement of the governing hand. We give these suggestions elsewhere in our present issue, as well as the modifications of Lord Redesdale's bill, to which we alluded in our last as being in course of preparation by influential parties on behalf of the gas companies. The law lately passed by the State of New York on the same subject is already before our readers, who have thus the means of appreciating the light in which this question is viewed in communities where democratic, constitutional, and despotic systems of government prevail.

Reserving the legislation across the Atlantic and on the other side of the Channel for consideration at a future period, it is of importance that the bearings of the proposed legislation in this country should be clearly understood by manufacturers and consumers of gas, and by meter-makers, whose interests may be considerably affected by it. We propose, therefore, to direct their attention to the alterations proposed by the Gas Companies in the original bill.

All parties seem to agree that distilled water of a given temperature, and under a defined barometric pressure, is the best medium for determining the capacity of the standard measuring instruments to be employed, and that the space occupied by 62·321 pounds avoirdupois of water, at a temperature of 62° Fahr., and under a barometric pressure of 30 inches, shall be deemed to be a cubic foot. It is a great step gained to have this standard unanimously accepted, as it is notorious that the standards adopted by different manufacturers vary between themselves to a greater extent than the 4 per cent. of tolerated variation which is proposed to be admitted by the bill.

Our objection to the machinery created by the 5th and 6th Wm. IV., cap. 63, for carrying out the measure, seems to have been adopted by the Gas Companies, who propose that districts shall be formed, and that inspectors shall be appointed wherever the Board of Trade may see fit; but as the offices are to be self-supporting, and will therefore be limited to the districts where the meter factories are situated, and to a few of the large towns, an important section of the gas-consuming public will be excluded from any participation in the advantages which the bill is intended to afford them, more especially in regard to disputes, which might be at once set at rest if every company or person selling gas were compelled to provide and keep in repair duplicates of the standard testing apparatus, and to permit any of their customers or their agents to use the same. On this subject we refer the reader to the observations made under this head in the JOURNAL of May 24 last.

Section V. of the amended Bill appears to us to want precision in respect of the term "measuring capacity," and is defective in not requiring the stamp to be so affixed as to prevent the meter being subsequently tampered with. Our views on this point are embodied in the following amendment, which we print side by side with the clause as it stands in the amended Bill of the Gas Companies:—

SUGGESTED AMENDMENT.	CLAUSE AS PROPOSED.
V. All gas-meters which shall be sold after the expiration of twelve months from the passing of this Act shall have their measuring capacity or the number of cubic feet, or multiples or decimal or fractional parts thereof, delivered at each revolution or complete repetition of the measuring machinery, denominated, stamped, or marked on the outside of such meters, in legible figures or letters, and shall have soldered on the front thereof the stamp or badge of office of an inspector of meters under this Act, in such manner that the front of the meter cannot be removed without such badge or stamp being injured or defaced; and every person who, after the expiration of such twelve months, shall sell any meter, and part with the possession thereof before it has been so stamped, shall be liable to a penalty of five pounds.	V. All gas-meters which shall be sold after the expiration of twelve months from the passing of this Act shall have their measuring capacity denominated, stamped, or marked on the outside of such meters, or the indices thereof, in legible figures and letters; and every person who, after the expiration of such twelve months, shall sell any meter, and part with the possession thereof before it has been so stamped, shall be liable to a penalty of five pounds.

The most important alteration in the bill is, however, that made by Section XII., in which rules are laid down for testing meters, which, if adopted, will, we apprehend, lead to endless confusion. The measurement of an aëriform fluid is at all times a delicate operation, but it becomes most difficult and uncertain when that fluid is combined with condensible vapours capable of being absorbed to some extent in fresh water. Coal gas contains from 4 to 10 per cent. of such vapours, according to its quality, and on this score it cannot be depended upon for producing uniform results when used for ascertaining the cubical contents of the measuring-chambers of gas-meters. Atmospheric air is less liable to be thus affected, as its constituents are permanent elastic gases capable of being but slightly absorbed by water, and requiring only uniformity of temperature to produce uniform results. It is, therefore, better adapted than gas for testing water-meters, as care need only be taken to have the air and the water of equal temperatures in order to obtain indications of unimpeachable accuracy. The following suggestions embody our views as to the conditions under which meters should be tested, and we again print them side by side with the clause as it stands in the amended Bill of the Gas Companies:—

SUGGESTED AMENDMENT.	CLAUSE AS PROPOSED.
XII. The following rules shall be observed in testing any meter under the provisions of this Act:—	XII. The following rules shall be observed in testing any meter under the provisions of this Act:—
The meter to be tested shall be fixed on a level base, and shall be tested with the outlet open by passing through the meter measured quantities of atmospheric air of the same temperature as the air of the room in which the testing is performed, and under a pressure at the inlet of the meter equal to a column of water one half of an inch high, so as to ascertain the number of revolutions or complete repetitions of the measuring machinery produced by the passage of the measured quantity of atmospheric air through the meter.	The meter to be tested shall be fixed on a level base, and shall be tested at five-tenths pressure with the number of lights it is constructed for, and no more, each light consuming six feet per hour.
If the meter be a water-meter (that is to say, a meter in which the capacity of the measuring-chamber is	If the meter be a water-meter (that is to say, a meter in which the capacity of the measuring-chamber is

regulated or adjusted by means of water or any other liquid), it shall be tested, when charged with water of the same temperature as that of the air of the room or apartment in which the testing is performed, at the highest and lowest levels at which gas can be made to pass through the meter, and every meter shall be deemed an incorrect meter within the meaning of this Act if when so tested its index shall register quantities varying more than two per centum from the true standard of measure.	regulated or adjusted by means of water or any other liquid), it shall be tested at the correct water-level, and at the highest and lowest levels at which gas can be obtained.
If the meter be a dry meter (that is to say, a meter in which the capacity of the measuring-chamber is not regulated or adjusted by means of water or any other liquid), it shall be tested whilst consuming only two cubic feet per hour, and every meter shall be deemed an incorrect meter within the meaning of this Act if when so tested its index shall register quantities varying more than two per centum from the true standard measure.	If the meter be a dry meter (that is to say, a meter in which the capacity of the measuring-chamber is not regulated or adjusted by means of water or any other liquid), it shall be tested whilst consuming only two feet per hour at three inches pressure.
Every meter shall be allowed to pass if not more than two per cent. incorrect.	Every meter shall be allowed to pass if not more than two per cent. incorrect.

In drawing Section XIII., it seems to have been overlooked that dry meters make four, and some of them six vibrations to each complete repetition of the action of the meter. The word "vibration" may be struck out, and the ambiguity which its presence created will disappear.

The bill, both as originally drawn and as proposed to be amended, omits all reference to the meter inspectors already appointed by the local authorities of London, Liverpool, &c., whose functions would be superseded by the inspectors to be appointed under the proposed Act, unless the existence of the former be recognized in the bill, and their acts confirmed. In Liverpool alone some 16,000 meters have passed the requisite examination and have received the official stamp, which it would be an act of gross injustice to ignore.

The managers of the metropolitan gas movement have concocted the bill which they intend to bring before Parliament for regulating the supply of gas in London and the surrounding districts. The preamble of the bill is considerably longer than the preamble we foreshowed as the one which Mr. Hughes and Dr. Bachhoffner would have drawn up had they been entirely uncontrolled, and without being a whit more consistent with the previous declarations of the delegates than our brief exemplar, it is inconsistent with itself, and presents a jumble of words from which it is difficult to extract the meaning. The authorized preamble commences by including among the companies to be comprised within the "Metropolis Gas Regulation Bill" several that are situated in suburban and thinly populated localities, some of which, too, have special Acts of Parliament of recent date. It then announces that these companies having until recently acted in competition with each other, during which competition the consumers were protected from exorbitant charges; and having thus set forth the advantages of competition, and stated that it no longer exists, because the companies have agreed to divide the metropolis into districts allotted to each, the preamble proceeds to declare —"And whereas *it will be for the advantage of the public* that the said gas companies, and all other gas companies hereafter to be formed, and other persons supplying gas to the public in the metropolis, *should so confine their operations to particular districts*." We have frequently had occasion to notice the strangely illogical conclusions deduced from given premises by those who manage affairs for the delegates, but in this deliberately concocted panacea for all their grievances they have surpassed themselves; and they wish to have it recorded among the statutes of the realm, as the dictum of absolute wisdom, that great benefit having heretofore been derived from competition, it will be to the advantage of the public that it should henceforth be discontinued!

The sense of justice and the wisdom displayed in the preamble of the bill are fitting preludes to its numerous clauses. The effect of them would be to enforce in the most vexatious manner all the conditions of supply, with the exception of a lower price, which the delegates have from the first endeavoured to impose, and though some of those conditions are unobjectionable *per se*, and would probably be conceded by the gas companies in an amicable arrangement, the methods by which they are attempted to be executed is most unreasonable, and will, of course, excite strong opposition. The quality and illuminating power of the gas, the pressure in the mains, and the inspection of meters, are the principal points to which the provisions of the bill are directed; and if it were to pass through Parliament as at present framed, instead of being called an Act for Metropolis Gas Regulation, its proper title would be the Metropolis Gas Prohibition Act, for it would be impossible for any company to supply gas in accordance with such regulations. Take, for example, the clauses referring to the quality of the gas. The bill provides that the gas "shall be free from ammonia, bisulphide of carbon, sulphuretted hydrogen, and other agents deteriorating its quality or its illuminating capacity." Now, it is well known to be quite impracticable to supply gas on a commercial scale that shall be chemically pure; and unless the wiseacres of Marylebone and Westminster, who profess to know so much about gas, teach the gas companies how to achieve impossibilities, the enforcement of that provision would be fatal to gas lighting in London. As if to extinguish gas lighting altogether, the nineteenth clause imposes a penalty of £100 if the gas shall "*at any time*" be of a less illuminating power than it ought to be, or shall not be free from "all agents deteriorating its quality;" and in addition to that penalty, it is provided that a fine of £10 per day shall be imposed during the time such "offence" shall continue. The appointment of chemical examiners to test the quality of the gas is given to the vestries, who are to provide the requisite apparatus and to pay those officers "out of any funds applicable for parochial purposes." The framers of the bill, however, seem to have a discreet want of confidence in the capacity of the vestries to appoint a competent person to fulfil the important duties of such an office; therefore it is provided, in subsequent clauses, that if at any time "complaint as to the *purity* (!), illuminating power, or pressure" of the gas be made by any consumer, the matter of such complaint is not to be inquired into by the chemical examiner appointed by the vestry, but by a competent person to be appointed by the Metropolitan Board of Works; on which body, indeed, a vast deal of additional work is intended to be thrown by the framers of the bill.

The provisions as to the pressure are only a little less objectionable than those relating to the quality of the gas. On the subject of pressure, there is great diversity of opinion among the delegates, for whilst in some quarters they complain of its excess, by which it is affirmed the companies force a larger quantity of gas through the meters than can be consumed at the burners, in other districts they call out that there is a want of a sufficient supply. The high-pressure advocates seem to have gained their point in the preparation of the bill, and not content with a good supply of gas at night, they desire to have a plentiful leakage during the day. They insist that a pressure of ten-tenths at least must be always maintained in the premises of the consumer, and if at any time it should be less than that, even in houses most distant from the works or at the lowest level, the penalty of £100 is to be imposed, with the additional fine of £10 per day should the "offence" be continued. To keep up a constant pressure of one inch head of water on the most distant premises would require a greater pressure to be maintained at the works; and the increased leakage that would be produced by such useless pressure would materially enhance the cost of the gas which reaches the consumer's burner.

The provisions respecting the quality and pressure are fully equalled in impracticability by those relating to meters, which occupy many clauses of the bill. The meter inspector or inspectors—to be appointed by the Metropolitan Board of Works—is to be invested with full powers to enter the works of any gas company for the purpose of inspecting all the meters on the premises, and "to remove any such meter or meters, and to substitute another or others in lieu thereof, and shall have power to open and inspect any such meter or meters, and to test the correctness of the same by any such experiments as the said inspector shall think fit, and every such meter which the inspector shall condemn as being incorrect, or order to be removed, shall be removed by the company, undertaker, or other person whose property it is, and shall be replaced by a new one;" and, further, every meter on the premises of any company "which shall be declared incorrect by the said inspector, shall be marked by him with some clear and special mark as incorrect and condemned, and no company or undertaker shall thereafter supply any such meter so marked to any consumers of gas." Such extensive powers would be liable to great abuse, and would occasion much annoyance to the companies in the conduct of their business. The gas companies are not allowed any voice in the choice of the officer, who might interfere most

vexatiously with their concerns; all that they are permitted to do in the matter is to pay the salaries of the officers so appointed. How many of these inspectors it is proposed to appoint is not stated, but it would require an army of them to fulfil the conditions of the twenty-first clause, which declares that within six months from the passing of the Act no meter shall be used by any consumer until it has been inspected and tested and marked; and the difficulty of providing a sufficient number of meters within the time specified is increased by making it imperative that the meters to be approved must be found by the inspector to be "incapable of being made to register falsely" more than 2 per cent. Whether any existing meter would fulfil that condition may be questioned, but at all events we may venture to say that nine-tenths of those now used would not meet that requirement, and the brand of condemnation would confiscate the property vested in meters within the metropolis.

Though it is stated incidentally that all approved meters are to be stamped, no direct authority is given to the inspectors for that purpose, nor is any provision made for the supply of premises and apparatus which the extensive operations of testing and stamping all the meters used by the gas consumers of the metropolis would necessarily require. If, after all the care of the inspectors to prevent the meters from registering falsely, some of them should nevertheless either fail to act altogether, or should "register against the consumer," and the quantity of gas consumed should be a matter of dispute, the police magistrate of the district is to be called on to estimate the flow of gas through burners of a given size, at an assumed pressure, and his decision is to be taken as indisputably correct. Consumers are to be allowed to use their own meters if they think fit, but otherwise they are to pay a rent to the companies, at rates not mentioned in the draught of the bill before us. It is provided, however, that no company shall be bound to supply any meter exceeding sixty lights, but if they agree to supply meters of larger sizes they are to be prohibited from charging a rent of more than 12½ per cent. above the cost price; and any contract made to the contrary "shall be null and void."

The proposed regulations as to the price of gas do not materially differ from the prices now charged; 4s. 6d. per 1000 feet being the maximum for gas of not less than 12 sperm candles; and if gas of a higher illuminating power than 18 sperm candles be supplied, the price is fixed at 6s.; but the company supplying the better quality of gas is to give three months' notice of their intention to do so before they can raise the price.

In the preceding summary of the Metropolis Gas Regulation Bill we have only noticed those clauses which are the most objectionable, but it contains numerous other provisions that would render it practically inoperative. Many of the clauses, though profuse in words, are wanting in precision, and they are so vague and contradictory as to be unintelligible. It is impossible that Parliament can sanction such an attempt at legislation as this abortion of the Metropolitan Delegates, yet it is very desirable that the gas companies of the metropolis should be prepared to expose its absurdities, and to lay before a committee of the House of Commons counter propositions in a fair and liberal spirit for regulating the supply of gas which they have virtually monopolized.

Register of New Patents.

2696.—John Ramsbottom, of Accrington, Lancaster, engineer, for "*Improvements in machinery or apparatus applicable to water-meters, and to indicating and regulating the flow and pressure of fluids generally, and in obtaining motive power from the same.*" Patent dated Nov. 27, 1858.

These improvements relate to machinery or apparatus for measuring water and obtaining motive power from the same, and are further improvements upon an invention of the patentees and one John Charles Dickenson, for which letters patent (No. 2700) were granted on the 30th of November, 1855, the novelty of which patent invention mainly consisted in a peculiar valvular arrangement and the mode of actuating the same, the object of which was to obtain a uniformity of supply, unaccompanied by check, concussion, or counteraction. The first portion of the present invention relating to water-meters has similar objects in view, and aims at effecting them in a more complete and efficient manner by constructing the valves and water-ways so that, whether the valves be flat or plug-shaped relatively to each other, the supply and exit ways shall be open, whilst the valve shall traverse over one-third more space than was accomplished in the former mode of construction. These improvements will render this contrivance applicable to meters or other hydraulic apparatus, whether they be actuated by flexible or rigid moving parts.

The second part of these improvements consists in constructing the valve in a slightly different manner, and using it inverted as a seating, upon which a boss shall rotate, containing a cavity of suitable size, into which the fluid shall pass during a certain portion of the revolution, and out of which it shall escape for use during another portion of the revolution. The said boss must be suitably ground upon the seating, and carry a wheel worked by a worm or pinion, situated at right angles, such worm or pinion to be actuated by any motion, and the arrangement thus made available for lubricating purposes, supplying definite quantities of fluid matter for any use required.

The third portion of the invention consists of an improved arrangement of actuating valves by the expansive force of two or more metals which are acted upon differently by the same temperature. A series of copper, brass, or other suitable metallic rods are attached to a series of iron, steel, or other suitable metallic bars, and the difference in the motion obtained in consequence of the unequal expansion, is made to operate on any suitable valve or valves for the purpose of regulating the flow of fluids by means of the difference of expansion of the different metals, the accumulated difference of expansion of a number of rods of different metals being made available for the purpose.

2745.—Frederick Warner, of Jewin Street, London, John Derbyshire, of Longton, Staffordshire, and Alexander Maun, of Little Britain, London, for "*An improvement in the manufacture of cocks and taps.*" Patent dated Dec. 1, 1858.

For the purpose of this invention the valve is suspended to, or formed on the end of, a tube of india-rubber (by preference vulcanized india-rubber). The other end of the india-rubber is flanched, so as to attach it to the body of the cock or tap. The spindle or screw by which the valve is pressed on its seat passes into the tube of india-rubber, which is shorter than the distance between the valve-seat and point of connexion to the flanch of the tube of india-rubber, so that the tube will require to be extended in length in order to close the valve; and, consequently, the india-rubber tube, when released, aids in lifting the valve from its seat.

2764.—George Edward Noone, 28, Hodson Street, Francis Street, Newington Butts, London, engineer, for "*Certain improvements in machinery for generating gas from coal.*" Patent dated Dec. 3, 1858.

These improvements consist, in the first place, in the application of a cylindrical back to kitchen ranges and other stoves used for cooking or heating purposes.

2. A kind of semi-circular cylinder called a "feeder," with perforated moveable front to be charged with coal for gas making.

3. A description of apparatus for placing feeders in position in cylindrical back when charged with coal, and for relieving the same from coke, and also a kind of sheet-iron shield to keep dust from the gearing.

4. A portable novel construction of apparatus for purifying gas, which, by a peculiar application, is rendered a wet and dry purifier, combining also a mode of sealing to prevent explosion.

5. A mode of regulating the pressure for consumption of gas, and for self-supplying the whole machine with water, for cleansing and other purposes, with the means of communicating motion to the call-bell when coal is required.

6. A peculiar construction of furnace for generating gas and steam at the same time and with the same coal, which is applicable to all descriptions of furnaces.

Lastly, a kind of iron truck for withdrawing hot feeders from the furnace, and replacing others, without smoke or inconvenience from heat when of a size difficult to move by hand.

2776.—Edouard Aristide Servier, of Paris, engineer, for "*Improvements in pressure and fluid level indicators.*" Patent dated Dec. 4, 1858.

This invention relates to certain peculiar constructions, arrangements, and combinations of apparatus for the purpose of indicating a maximum or minimum pressure of steam, air, or gas, or the height or level of the surface of any liquid in a vessel or reservoir. The apparatus is applicable to all pressure and fluid level indicators, whether indicating by a vertical motion in a straight line, or by a circular motion round a dial; and its object is to indicate, at any distance from the locality where the indicator is placed, the moment at which the pressure or level, as the case may be, has reached a maximum or minimum, the limits being adjusted or regulated beforehand to suit the requirements of the case.

The peculiar characteristic of the apparatus is the giving of different signals for each extreme limit, and of a third signal for the intermediate degrees of pressure or points of elevation, and the invention is based upon the following well-known principle:—Where an electric current passes along a wire in the immediate neighbourhood of a magnetic needle, the latter will be deflected from its normal position in one direction or the other, according to the direction of the electric current; and this principle is applied to existing pressure and level indicators for obtaining the objects hereinbefore mentioned.

In carrying out this invention a commutator is adapted to the pressure or level indicator, arranged in such manner that when the indicator assumes the position corresponding to a maximum or minimum limit, which limit is required to be signalled or indicated at some distance removed from the indicator, an electric current is established, but in such manner that when the maximum limit is to be signalled, the current passes in one direction, while for a minimum limit the current passes in the contrary direction along the same wire which connects the two stations or localities. If a galvanometer, having either a horizontal or vertical needle, be placed between, and form part of the circuit at the distant station, the magnetic needle of the galvanometer will be deflected in one direction for a maximum, and in an opposite direction for a minimum limit of pressure or level, and will remain in its normal position during all intermediate points between those limits. In lieu of a galvanometer, an electric magnet may be placed in circuit, the poles of which will be reversed by simply reversing the currents by the aid of a commutator. By this means one of the poles of the magnetic needle placed near the electro-magnet will be attracted by one end for the maximum limit, and by the opposite end for the minimum limit, the normal or intermediate position being always maintained during the intermediate positions of the indicator. The system of signals may be perfected by the use of two electric indicating bells, giving a different sound for each of the extreme positions of the indicator.

The claims are for the general construction, arrangement, and combination of the indicating apparatus for the purposes set forth; for the construction and arrangement of commutators or apparatus for reversing electric currents in the manner described, for the purpose of indicating at a distance, by separate and distinct signals or signs, the attainment of a given maximum or minimum pressure or level, by means of one electric wire or circuit in combination with a magnetic needle or electro-magnet, each reversal of the current in the wire producing a different signal as described.

2811.—Charles de Capot and Alexandre Jarriant, of 10, Route de la Révolte, Neuilly-sur-Seine, France, for "*A new hydraulic counter.*" Provisional protection only obtained. Dated Dec. 8, 1858.

To the pipe from the main, or other suitable supply, a flanged pipe is connected to a cock or tap, the pipe from which opens outward at the bottom in the shape of a truncated cone, and flanged at the bottom so that it may be connected to a case enclosing a cylinder of gutta-percha or other suitable material, having any suitable number of perforations; though the decimal ratio will be found preferable, the solid part of the cylinder being indented where necessary. Connected with the aforesaid case is a box communicating by a pipe with one of the holes of the gutta-percha cylinder, and also by another pipe to a bucket-wheel, formed with any required number of buckets, starting from about the centre of the wheel and sliding against the interior of the casing, at the bottom of which there is an aperture covered with wire gauze or other suitable perforated material. To the lower part of the case containing the gutta-percha cylinder is connected a pipe for giving the supply, the single hole before alluded to being simply for the purpose of measurement. The shaft of the bucket-wheel is made to work any suitable gearing, having hands pointing to any number of dials, so that the exact quantity of the water passing through one hole of the gutta-percha cylinder can be measured with accuracy, the sum of which, multiplied by the number of holes in the said cylinder, will give the amount of supply.

2820.—John Barrow, Jun., of Manchester, manufacturing chemist, for "*Improvements in the treatment of coal gas tar, and of the oils obtained by the distillation of the same, and for the application of substances obtained thereby.*" Patent dated Dec. 9, 1858.

In any convenient apparatus is submitted to the process of distillation, a mixture in suitable proportions of coal gas tar and any one or more of the bodies known as the oxide of amyl, the hydrated oxide of amyl, the chloride of amyl, the acetate of amyl, or the carbonate of amyl, with or without the addition of the hydrated oxides of ethyl or methyl, or of bodies derived therefrom; or coal tar is distilled alone, and after separating the naphtha which first distils over for rectification in the usual way, the succeeding oils are collected and submitted to any of the well-known means of purification, and the purified or partly purified oils are mixed with suitable proportions of oxide of amyl, hydrated oxide of amyl, or the chloride, acetate, or carbonate of amyl, the mixture being afterwards distilled in any suitable apparatus. Or in any suitable proportions are mixed together purified coal tar, oil, and the oxide, chloride, acetate, or carbonate of amyl, with or without the addition of hydrated oxides of ethyl, methyl, or of bodies derived therefrom, and with or without the process of distillation; and the oils obtained by any of these processes are applied to the purposes of illumination, lubrication, or other purposes for which they may be found applicable. The lighter and more volatile oils are applied to illumination, and the heavier and less volatile to lubrication, either alone or mixed with other bodies, such as animal and vegetable fats and oils, tallow, lard, oil, neat's-foot oil, cod or whale oil, palm oil, rape, olive, gallipoli, and linseed oils, or the fats obtained by the rendering of animal matters or substances.

The claim is for the use and application of the oils obtained by any or all of the processes hereinbefore described for the purposes of illumination or lubrication.

2839.—George Ferguson Wilson, of Belmont, Vauxhall, London, for "*Improvements in the manufacture of lubricating oils.*" Patent dated Dec. 10, 1858.

This invention has for its object improvements in the manufacture of lubricating oils, and consists, first, in combining rosin oil, the oil produced from bituminous and schistose bodies, such as petroleum, Boghead, or other coal or shale; and by preference the rosin oil is prepared by distilling rosin by surcharged steam, then producing rosin oil in the ordinary manner, and then distilling such oil by the use of surcharged steam, though other preparations of rosin oil may be employed. By such means body is given to oils distilled from bituminous and schistose bodies.

In carrying out this part of the invention, it is preferred to combine the oils above mentioned in the proportions of one part by measure of the petroleum oil, specific gravity 8·70, with two parts by measure of rosin oil; but these proportions are not essential, but to some extent may be varied.

2. This invention consists in the use of rosin oil, by preference manufactured as above described (though other rosin oil may be used), in combination with cocoa nut oil, or the oleine of cocoa oil, or the oil of oleine, obtained from calhoun palm, or from the oil of oleine obtained from the kernel of the nut from which palm oil is obtained, by which means oils of suitable body for lubrication are obtained.

In carrying out this part of the invention, it is preferred to combine the oils above mentioned in equal parts by measure, but this may be varied.

3. The invention consists in combining with the compound oil, as first described, one or more of the oils or oleines secondly mentioned; and in carrying out this part of the invention it is preferred to employ the oils above mentioned in the following proportions:—

8	parts	by measure of	refined cocoa nut oil.
2	„	„	refined rosin oil.
2	„	„	petroleum oil.

Another compound is—

16	parts	by measure of	refined cocoa nut oil.
16	„	„	refined rosin oil.
12	„	„	petroleum oil.

All these proportions may be varied, and none of the above-mentioned oils separately are claimed for the purpose of lubricating machinery, but it is ascertained that when rosin oil alone, or petroleum oil, or any other of the oils herein described, are employed singly, so good and useful a lubrication is not obtained as when they are used in combination—the one appearing to correct or supply the insufficiency of the other.

2843.—Stephen Dudgeon, of Sheffield, for "*An improved gas regulator.*" Patent dated Dec. 11, 1858.

This invention has for its object improvements in governing or regulating the supply of gas to the burners or places of combustion. For this purpose the gas is introduced into one chamber or compartment of the regulator, and from this chamber it passes into a second; but the amount of gas passing from the one chamber to the other is regulated by means of a valve which is caused to open or close a passage between the compartments, more or less, as circumstances may require.

In these particulars this improved gas regulator does not differ materially from other gas regulators. The valve for regulating the passage of the gas between the inlet and the outlet chamber or compartment of the regulator is guarded by a disc or cover, which is similar to others in use, having turned-down edges which enter a trough containing quicksilver or other fluid. One arrangement which is adopted for operating the disc or covering with the valve attached, is to suspend it upon centres or axes, or other suitable bearings placed near one of its ends; the points of these centres or axes resting against bosses or pads in which the points of these centres or axes work, thereby preventing undue pressure on the cover, which, if screwed too tight by means of the centres, breaks the joints and causes an escape of gas.

Another arrangement adopted for operating the valve, is to remove the disc and to place loose weights on the top of the valve covering; the amount of pressure can thus be regulated at pleasure, a cap being provided in the top surface of the regulator—in which cap the valve and cover, with the super-imposed weights, can rise or fall, and the aperture being more and more closed by the lifting of the valve and cover by the pressure of the gas in the apparatus; and by these means the supply of gas to the burners is regulated and maintained uniform under every variety of pressure in the main supply.

The claim is for the arrangement and combination of the parts of the regulator constructed and operated substantially as hereinbefore described and for the purposes set forth. Also, the combination of the reservoir with the flanged pads or bosses and the outside flanges, the whole of these parts being disposed, with respect to the other parts of the regulator, substantially as hereinbefore described and set forth.

2861.—David Anderson, of Glasgow, N.B., ironmonger, for "*Improvements in taps and valves.*" Provisional protection only obtained. Dated Dec. 14, 1858.

This invention relates to improvements in the arrangement and construction of taps or valves to be applied to pipes or ducts for the transmission of fluids. In a modification of a tap or nose-cock embodying a portion of these improvements, the shell of the tap is made in two parts for the introduction of the closing-valve, which is a slight conical plug of metal, or of metal covered with an elastic material, such as vulcanized caoutchouc or cork, or entirely of vulcanized caoutchouc or cork. The plug or valve is fixed on a spindle, the inner end of which works in a bridge-piece in the back part of the shell, the outer end passing out at the front of the tap to a button or handle by which it is operated. The front part of the shell is made conical internally, the narrow end being outwards; and the plug closes this space by the pressure of the fluid, or by the pressure of a spring introduced into the case where the pressure in the pipe is insufficient. The tap is opened by pressing in the spindle and with it the plug, which allows the fluid to escape round the plug. Or the spindle may be screwed, so as to open or shut the valve on being turned. Instead of the closing surfaces being conical, they may be at right angles to the centre line of the shell, in which case a ring of vulcanized caoutchouc may be inserted in a groove, either in the plug or valve or in the seating.

2900.—James M'Kenzie, manager to William Strode, of St. Martin's-le-Grand, London, gas engineer, for "*Improvements in those gas-burners known as ventilating sun burners.*" Patent dated Dec. 18, 1858.

These burners consist of a number of jets placed horizontally under funnels or inverted cones or chimneys of sheet iron, or other suitable material. These chimneys are generally two in number, but sometimes three or more are used. The inner pipe or chimney is furnished with a valve, adjusted for the purpose of controlling the current of hot air and the products of combustion of the gas, and by means of which a portion of the same is diverted from the inner pipe or chimney and made to pass through a grating placed between the same and the outer pipe or chimney, the effect of which arrangement is to make the gas jets burn and maintain themselves in a horizontal position.

When it has been found necessary to fix these burners below the ceiling of a room, the iron funnels, pipes, or chimneys, by intercepting the light, have caused a dark shadow on the ceiling, more or less extended, according to the distance the burner projected below the ceiling. When the exterior of the funnels or chimneys has been ornamented with cut glass or other ornaments, the upper parts of such ornaments have been thrown into the shade.

This invention is designed to remedy these defects, and consists in perforating or forming apertures in part of the inner funnel, pipe, or chimney, and also in part of the outer one, in order to allow the light to pass, and in filling up the openings with talc, mica, or other suitable transparent material. The shadow on the ceiling or walls will thus be prevented, and all parts of the ceiling will be equally lighted up.

The claim is for making openings or apertures in the funnels or chimneys, and filling the same with mica, talc, or other suitable transparent material for the purposes hereinbefore described.

2903.—Andrew Peddie How, of Mark Lane, engineer, for "*Improvements in cocks or stop-valves.*" Provisional protection only obtained. Dated Dec. 18, 1858.

This invention consists in substituting for the ordinary plug-cock and the single station-valve, or other equivalent valve,—contrivances at present in use,—a double-bottom spindle-valve (somewhat similar to the double-bed valve), and so constructing the shell of the cock or the valve-case as to form two valve-seats therein, and the inlet and outlet passages by

coring the shell-casting. By making a suitably large opening on the top side of the shell, a passage is provided for the spindle with the two valve-discs, the area of the upper side of the lower valve-disc being the same, or very nearly the same, as the area of the under side of the upper valve-disc, and the opening through the upper valve-seat being just sufficient to permit the lower valve-disc to pass through it, and when the passage-way of the cock or stop-valve is closed, the two valve-discs rest upon, and accurately fit, their respective seats.

The opening at the top of the shell of the valve or the valve-case may be closed by a screwed cap or a close-fitting bonnet or cover having a stuffing-box or gland through which the upper end of the valve spindle, whether it be plain or screwed, may turn or work for the purpose of opening or closing the valve, and any suitable handle or lever may be attached thereto.

Cocks or stop-valves thus constructed require but a very slight power to open or close them against very heavy pressures, the pressure on the valves being balanced.

2911.—Alfred Vincent Newton, of 66, Chancery Lane, for "*An improvement in lanterns.*" A communication. Provisional protection only obtained. Dated Dec. 20, 1858.

The object of this invention is to obtain, by very simple and economical means, a combination of reflecting surfaces with or without a lens that will project the rays of light from a lamp into space in a concentrated form and in parallel lines. The invention consists mainly in the employment of a peculiar arrangement of conical and convex reflectors, which form a chamber for the reception of the lamp, and also effect the object above alluded to.

Mounted in the lantern case is a conical reflector, with its axis set horizontally. The small end of this cone is closed by a lens or glass, and the other end by a convex reflector, which is fixed to the lantern door. The lamp projects up from the lower side of the cone, and (for marine purposes) is supported in gimbles, and immediately above it is a smoke tube, which passes upwards through the conical reflector. By the lamp being set so that the axis of the conical reflector will pass through the flame, the rays of light reflected by the convex reflector will be distributed over the conical reflecting surface and thrown back into the lens, whence they will pass out into space in parallel concentrated lines.

2740.—Richard Laming, of Hayward's Heath, Sussex, for "*Improvements in purifying gas and in turning sulphuretted hydrogen, carbonic acid, and ammonia, or their compounds, to profitable account.*" Patent dated Dec. 1, 1858.

To purify gas from sulphuretted hydrogen, carbonic acid, and ammonia, it is first scrubbed with raw gas liquor from the condensers and mains, pumped free from tar through an ordinary scrubber as near as possible at the rate in which it is produced, receiving it after it has passed the scrubber into a small cistern. The gas, after ascending through this first scrubber, ascends through three others in succession, the fourth of which is supplied with common water entering in at least sufficient quantity to keep the soluble impurities of the gas from mounting to its upper part, which may be judged of by the usual tests applied to trial cocks there placed. This water is pumped away, as fast as it arrives at the lower part of the vessel, into the upper part of the third scrubber, in which it becomes a stronger solution of ammoniacal liquor. From the bottom of the third scrubber the liquor flows out into the small cistern already mentioned, in which it mixes with the liquor from the first scrubber, and which is so constituted and fitted with communications as to overflow (as may be determined from time to time) into one or other of a series of large vessels filled with sawdust or other suitable porous material mixed with a metallic substance capable of desulphurating, either wholly or in part, the liquor, and afterwards of recovering, by contact with atmospheric air, its power to act again in a similar manner. The metallic substance which is used for this purpose is one or other of the following—a compound of iron which is obtained by first decomposing any solution of that metal in hydro-chloric acid by sulphuret of calcium, such as may be dissolved out by means of hot water, from what the soda-makers call vat-waste, and afterwards exposing the resulting sulphuret of iron, washed or unwashed, to the air to become oxidized;—or a compound of manganese, particularly such as results from exposing to the air a hydrated sulphuret of that metal, which is made by first using the sulphuret of calcium in vat-waste, or from any other source, for decomposing solution of muriate of manganese (which is a waste or residue in the manufacture of chlorine), and then collecting the precipitated hydrated sulphuret and freely exposing it, washed or unwashed, to the atmosphere. For this purpose it is convenient to mix it with some porous material, or the compound of manganese may be an oxide obtained in a hydrated or effective state from any other source. Other preparations of iron, which are indicated in the present patentee's specification of an invention for which he obtained letters patent bearing date Feb. 3, 1857, may also be substituted for the different re-agents above named, for desulphurating the liquor to be used in the purification of gas by this invention.

By the time a desulphurating vessel has become full of liquor, the latter will be either wholly or in part deprived of sulphuretted hydrogen, according as the porous mixture is more or less rich in effective material relatively to the impurity of the liquor. If the result be not at first perfect, it will improve with more time. The stream of liquor arriving to be acted upon is then diverted into another desulphurating vessel, and the portion already accumulated is drawn off from the first vessel, through a filter of coarse cloth previously spread over a perforated false bottom within it, into a large tank, preparatory to its being used in the second scrubber of the series.

So soon as the desulphurating material has had its liquor sufficiently strained from it, the vessel containing it is to be connected with an exhauster or chimney draft, or other equivalent contrivance, so that air may be passed through it for its oxidation, after which revivification it may be again made use of as before. Or, instead of reviving the material by a current of air through desulphurating vessels, it may be simply exposed to the atmosphere, either in them or thrown out upon the ground.

When the desulphuration or revivification becomes too slow or imperfect to be satisfactory, the mass of material is caused to receive an additional quantity of its metallic ingredient, or it is exchanged for other entirely new. Instead of mixing the metallic ingredients with porous materials, they are sometimes stirred into the liquor to be desulphurated, and then, after recovering them by subsidence and decantation or by filtration, they are put in the air to revive; but this mode is less convenient than the other.

Ammoniacal liquor thus or otherwise deprived of its sulphuretted hydrogen, either together or in great part, is pumped into the second scrubber with a speed at least great enough to convert all the sulphuretted hydrogen and carbonic acid which the gas contains while passing through the second scrubber into soluble salts of ammonia, preparatory to their removal by the two scrubbers further on. This may be judged of by trial cocks and tubes communicating with the second scrubber near to its upper part, and plunged below into a little fresh water. The gas on escaping from that water will not affect the ordinary lead or lime tests, if the desulphurating liquor be in sufficient quantity. Should it do so, the quantity must be increased. If a larger supply of desulphurated ammonia be required than is furnished by the joint products of the first and third scrubbers, it may be obtained by allowing part of the liquor from the second scrubber again to enter the desulphurating vessel, or what is better, these joint products may be strengthened by hydro-sulphate of ammonia, which may be obtained as hereinafter described. It is preferred to distribute the liquor used in each scrubber over the surface of its scrubbing materials by means of a perforated pipe or pipes revolving within it, as is well understood; and so much of it from the second scrubber as is not returned to the desulphurating vessels, runs into a covered tank from whence it is drawn, to be made by any known means into either a concentrated solution or a solid form of ammoniacal salts for use in subsequent parts of the invention.

This part of the invention may be modified. When there is an abundant supply of hydro-sulphate of ammonia, it may be dissolved in the product of the water scrubbing, treated with the desulphurating material, and then used on the gas without the latter being previously treated with raw gas liquor. In this case the scrubbing with the desulphurated liquor should be done in the first scrubber, and the second made to receive the water washings from the third, mixed or not with raw gas liquor.

When the raw gas liquor is not used for purifying, it is to be distilled either alone or with the used purifying liquor, to form concentrated liquid or solid ammoniacal products wanted for the subsequent parts of the invention. Instead of the scrubbers, other kinds of washing apparatus may be substituted, and some insufficiency of fluid purification may, so far as sulphuretted hydrogen is concerned, be compensated for by causing the gas to pass, on its way from the final scrubber or washer to the gas-holders, through one or more ordinary dry purifiers charged with the oxidized sulphuret of iron or of manganese above mentioned, and which mixed with porous material, and used as dry lime, is adapted to deprive the gas of any sulphuretted hydrogen that may have passed over along with it. All the pumps should be in duplicate, made independent of one another by separating valves, easily got at, and well protected from the ingress of foreign matter. Each scrubber should be furnished with a bye-pass, and such other arrangements made that either the first or second scrubber may be used with desulphurated liquor in case of the second or first respectively being thrown out of action, and also that the third may be set to work with fresh water during any temporary inaction of the fourth.

Sulphuretted hydrogen, carbonic acid, ammonia, or other compounds, are turned to profitable account as follows:—Sulphuret of sodium is taken either alone or with the carbonaceous matter by which it is contaminated in the process of manufacture, and it is thoroughly mixed with about an equivalent proportion of carbonic acid in combination with ammonia, and it is preferred to use for that purpose the rough products which result from the distillation of the ammoniacal liquors hereinbefore mentioned. If the carbonate of ammonia be in the solid form, it may be ground with sulphuret of sodium, with or without admixture of carbonaceous matter. If the ammoniacal salt be in solution, then so much of the carbonaceous matter should be mixed with sulphuret of sodium as to absorb all the water that will be present, which admixture may be made either in manufacturing the sulphuret or afterwards. The mixture, with its equivalent dose of carbonic acid combined with ammonia, is put into iron pans, which are slid into iron retorts, the doors are luted on, and they are exposed to a gentle heat (which may be about 300° Fahrenheit) so long as ammonia or hydro-sulphate of ammonia continues to come off. It is important to observe that if the temperature be near a red heat, much carbonate of ammonia will be driven out of the mixture without having effected decomposition of the sulphuret of sodium, and that if the mixture of re-agents be in a pasty or fluid condition, it will either swell and overflow by the eduction-pipe, or by boiling undergo only a partial and unsatisfactory amount of decomposition. The quantity of ammoniacal carbonate needs not be very accurately adjusted to the quantity of sulphuret; an excess will do no harm, and enough may be known to have been present when at the end of the operation the soluble part of the solid matter in the pans dissolved in water does not blacken lead test paper.

The retorts in which the decomposition is effected are furnished with eduction-pipes sloping downwards, to conduct the volatile matters which escape from them into the lower part of a scrubber or open cylinder filled with small coke, brick, or other solid material, continually sprinkled with cold water, by which they are dissolved and washed down into a close tank arranged for receiving them. When vapours cease to leave a retort the pans are withdrawn, and others already charged are put in their places, while the solid product is treated by known means for obtaining in any marketable shape the carbonate of soda that it contains.

The ammonia having been made thus instrumental in purifying the gas, and in putting into marketable combination the carbonic acid originally contained both in the impure gas itself and in the liquors condensed from it, now presents itself dissolved in water and in combination chiefly with sulphuretted hydrogen, in which state it is particularly useful for affording, by treatment with metallic substances as already directed with respect to the condensed gas liquor and washings, a solution of ammonia in great part or altogether caustic. After thus treating it, it is used in

any required quantity for saturating and making soluble the two above-named acid impurities of gas, or its ammonia is re-used for the making of carbonate of soda as above described, after having been recombined with carbonic acid by receiving that gas into its solution, for which purpose it is not absolutely necessary that it should have been at first desulphurated. Or the desulphurated liquor is used, mixed or not, with condensed gas liquor or washings that have also undergone the process of desulphuration, or even either or both the last-named liquors unmixed with the first, for obtaining a solution of caustic ammonia of various degrees of purity, serviceable for various purposes in the arts. In this case the desulphurated liquor is first treated with lime, if it contain carbonic acid, and is then submitted to distillation in any manner competent to disengage its ammonia nearly free from watery vapour, receiving the ammonia into cold water sometimes after first passing it through one or more baths of caustic soda or potash in solution, with or without the intermediate bath of fixed oil.

Another part of the invention relates to the known application of sulphate of ammonia to the production of sulphate of soda and muriate of ammonia by its action on common salt, and consists in an improved manner of operating. Having mixed together about eleven parts by weight of dry sulphate of ammonia, and ten parts of dry salt, the mixture is subjected to a decomposing temperature as usual; but for the ordinary apparatus a heated clay retort is substituted, which retort communicates freely with, and leads to, another chamber so capacious as to remain cool enough to condense the vapours as they arrive in a state of flowers or separate crystals instead of the hard cake ordinarily produced at a much higher and less productive condensing temperature.

When the vapours from the charge cease, sulphate of soda is withdrawn from the retort, and from the chamber muriate of ammonia is obtained which is afterwards dried if necessary, and submitted in any convenient manner to powerful mechanical pressure, and thus formed into hard and dry cakes fit to take the place in the arts of sal ammoniac, for which it may be made an economical substitute.

Another part of the invention consists in adding about a chemical equivalent of sulphuret of sodium to a waste residue obtainable in the making of chlorine, and which consists chiefly of the sulphate of manganese mixed with sulphate of soda, the whole being in solution properly diluted with water. Sulphuret of manganese precipitates, which being separated and exposed to the air, becomes oxidized and of use as hereinbefore explained. From the solution, by evaporation, is obtained sulphate of soda.

The claims are for—

Purifying gas by scrubbing or washing it, first, with raw ammoniacal liquor, finally with water, and intermediately with the mixed products of those two scrubbings or washings subsequently to their desulphuration by any means, either wholly or in part.

Purifying gas by passing it through three or more scrubbers or washers in succession, the first being used with a solution of ammonia sufficiently free from saturating acids to convert both the carbonic acid and the sulphuretted hydrogen of the gas into soluble salts, and the remainder in succession with the same portion of water for finally washing out the ammonia and its compounds.

Combining the alternate oxidation of hydrated sulphuret of manganese by atmospheric air, with the use of the resulting compound, for the total or partial desulphuration of solutions containing hydro-sulphate of ammonia.

Preparing a compound of iron or of manganese for desulphurating solutions containing hydro-sulphate of ammonia, or for purifying gas, or other useful purposes by decomposing a solution of any muriate of either of these metals by means of sulphuret of calcium or available mixture or compound thereof, and afterwards exposing the precipitate to the air to become oxidized.

Decomposing mixtures of sulphuret of sodium and carbonate of ammonia by heat, in the absence both of fluidity and of temperature high enough to drive off the carbonate of ammonia undecomposed; also the presence in such mixtures, when submitted to decomposition by water, of carbonaceous or other suitable absorbent matter for enabling one or both of the re-agents to be added in solution, without the prejudicial interference of fluidity or pastiness.

Recombining the ammonia given off in the reciprocal decomposition of sulphuret of sodium and a carbonate of ammonia or fresh carbonic acid, whereby it is made serviceable for a repetition of the process many times in succession.

Manufacturing solution or water of ammonia more or less pure, by receiving into cold water ammonia distilled from liquor first deprived of sulphuretted hydrogen by revivifiable metallic substances, and also of carbonic acid, if present, by lime, with or without an intermediate purification of the ammonia during the distillatory process. Also the use of caustic solutions of soda or potash, and of fixed oil for the purification of ammonia gas on its way to cold water, by which it is to be dissolved.

Distilling muriate of ammonia from mixtures of sulphate of ammonia and common salt, from earthen retorts into chambers, for condensing the vapours in detached crystals or flowers, and the consolidation into cakes of flowery crystals of muriate of ammonia by mechanical pressure.

Obtaining a precipitated hydrated sulphuret of manganese for oxidation by atmospheric air, by decomposing solutions of the mixed sulphates of manganese and soda by sulphuret of sodium, with the simultaneous production of sulphate of soda in solution.

2936.—JOHN WHITELAW, of Dunfermline, N.B., ironfounder, for "*Improvements in sewerage and drainage apparatus.*" Patent dated Dec. 23, 1858.

This invention relates to the so arranging and constructing sewerage and drainage apparatus that, whilst the sewerage and drainage matters shall have free discharge, all objectionable effluvia from the passing matters are removed or prevented. In arranging receiving and discharging apparatus of this kind, the trap or sewer and drain-chamber is so contrived that the fluid matters discharged from the road or street are caused to flow into the receiver through a hinged grating into the body of the trap-chamber. From this part the matters flow off beneath a hanging diaphragm, thence passing off at the other side over the top of a second diaphragm or division, and thence down to the main sewer or discharge-duct. This diaphragm portion of the chamber is covered by a perforated plate of metal, on which is disposed a layer of charcoal, lime, gypsum, or other suitable and effective deodorizer, which layer again is covered in by an adjustable top plate level with the surface of the road or street.

The roof-water from the houses or other elevated surfaces is conducted down into the chamber at the part betweeen the two diaphragms, so as to discharge the water in the same way as the street surface-water. Another branch, also from the water-pipe, leads into the space containing the deodorizing matter. This branch serves to allow of the free escape of the gases from the chamber after passing through the deodorizing matter, so as to pass right up the water-conducting-pipes to the top of the house. In this way, so long as much rain-water is discharged into the trap-chamber, the gases are carried directly off down the drains; but when the water-pipes are empty, the deodorized gases are passed off high up into the air without doing any injury.

The claims are for—

1. The general construction and arrangement of apparatus for disposing of and deodorizing sewerage and drainage matter, as hereinbefore described, and shown in the drawings accompanying the specification, or any mere modification of the same.

2. The system or mode of deodorizing or treating sewerage or drainage in or by means of the apparatus described.

3. The system or mode of disposing of the deodorized gaseous matters, by carrying or conveying them into pipes which extend upwards some distance into the air, in order to prevent these gaseous matters from mixing with and thereby contaminating the lower stratum of air, as hereinbefore described.

2952.—WILLIAM BECKETT JOHNSON, manager for Messrs. Ormerod and Son, of Manchester, engineers, for "*Improvements in the employment of gas for generating steam, and in engines connected therewith.*" Patent dated Dec. 24, 1858.

This invention consists, firstly, in certain methods of regulating the combustion of gas according as more or less heat is required to be imparted to the boiler. For this purpose "the governor" of the engine is employed, and caused to act upon cocks or other such apparatus, so as to regulate the flow of gas. Secondly, for the like purpose, the pressure or the temperature of the steam or water is caused to act similarly to the governor.

Another part of the invention relates to the prevention of accident ensuing from the water becoming deficient. In such cases the supply of gas is caused to be shut off or diminished by the water falling below a certain level. A practical method of accomplishing this consists in the employment of a fusible plug, which, by melting, allows water or steam from the boiler to flow into the gas-pipe.

Another part of the invention consists in the employment of several independent chambers, provided with wire gauze, for burning "aërated gas," the supply to such chambers being so arranged that the governor may be caused to act upon them consecutively—that is, to close one before it operates upon another—so that the others may still have their proper supply of gas in proportion to the areas of their chambers, while means are also provided for the whole being closed at once.

Another part of the invention consists in the application of the "master light" for the purpose of relighting burners after the supply has been shut off and re-opened.

Another part of the invention consists in an arrangement of engine and boiler, to be used in conjunction with boilers heated with gas. The boiler is formed as a vertical cylinder of cast-iron, with a concave bottom of copper. To the side of this the cylinder is bolted, and the main shaft passes transversely over the boiler, carrying the fly-wheel upon the opposite side to the cylinder.

As applied to the employment of gas for generating steam for engine or other purposes, the claim is for—

1. The use of the governor for regulating the supply of gas.
2. The pressure or temperature of the steam or water for the like purpose.
3. The use of the fusible plug for the purpose aforesaid.
4. The consecutive action of the governor upon two or more chambers constituting gas-burners.
5. The use of the master light.
6. The arrangement of the engine and boiler described, and particularly in such arrangement the form of the bottom of the boiler.

PROVISIONAL PROTECTION

HAS BEEN GRANTED FOR THE UNDERMENTIONED INVENTIONS.

1406.—THOMAS GREENSHIELDS, of 11, Little Tichfield Street, London, for "*Improvements in purifying gas and obtaining ammoniacal and other salts.*" June 10, 1859.

1409.—ALBERT FREDERICK HAAS, of Camomile Street, in the City of London, merchant, for "*Improvements in lamp and gas shades or glasses.*" June 10, 1859.

1410.—FRANCIS PULS, chemist, of Roxburgh Terrace, Haverstock Hill, London, for "*Improvements in the treatment of hydro-carbons.*" June 10, 1859.

1426.—CONSTANTINE NICOLAUS KOTTULA, of Liverpool, soap manufacturer, for "*A means of cleansing or purifying the 'Thames.'*" June 13, 1859.

1442.—JOZÉ LUIS, of 1B, Welbeck Street, Cavendish Square, London, patent agent, for "*A new syphon-meter for liquids.*" June 16, 1859.

1443.—JOZÉ LUIS, of 1A, Welbeck Street, Cavendish Street, London, for "*An apparatus for regulating individually the pressure, expenditure, and light in gas-burners.*" June 16, 1859.

1480.—RICHARD LAMING, of Hampstead, Middlesex, for "*Improvements in purifying gas, and in obtaining and reproducing materials useful for that purpose.*" June 20, 1859.

NOTICES HAVE BEEN GIVEN OF INTENTION TO PROCEED WITH THE UNDERMENTIONED INVENTIONS.

427.—RICHARD COOKSON, of Layton Hawes, near Blackpool, Lancaster, gentleman, and CHARLES WILLIAM HOMER, C.E., at Castle Hill, near Northwich, Chester, for "*Improvements in machinery for making bricks,*

tiles, tubes, and other articles of plastic materials, and in the mode of joining drain-pipes." Feb. 16, 1859.

441.—SAMUEL THOMAS COOPER, of Upper Clapton, gentleman, for "*Improvements in the use and application of artificial light.*" Feb. 17, 1859.

456.—WILLIAM CLARK, of 53, Chancery Lane, London, engineer and patent agent, for "*Improvements in pressure-gauges.*" A communication. Feb. 18, 1859.

490.—SAMUEL RIDGE, of Hyde, Chester, millwright, for "*Improvements in coupling or making the joints of pipes and other articles.*" Feb. 23, 1859

505.—JEAN HENRI GUILLAUME DANIEL WAGNER, of Paris, manufacturer, for "*Apparatus for cleaning water and removing all matters in suspension and dissolution contained in it, water intended to feed generators of all sorts; application also to other purposes, which besides, previous to its getting into the generators, is heated to the highest degree without almost any expense.*" Feb. 24, 1859.

539.—The Rev. HENRY MOULE, clerk, Master of Arts, of Fordington, Dorset, for "*Improvements in apparatus applicable to the evaporation of sewerage or other waters, and for affording heat for other uses.*" March 1, 1859.

1400.—ALFRED VINCENT NEWTON, of 66, Chancery Lane, London, mechanical draughtsman, for "*Improvements in gas-meters.*" A communication. June 18, 1859.

Parliamentary Intelligence.

A BILL INTITULED AN ACT FOR REGULATING MEASURES USED IN SALES OF GAS.

(*As proposed to be amended.*)

Whereas it is expedient that meters ordinarily used in sales of gas for lighting and heating purposes should be hereafter made according to a standard of measurement, and that the same should be stamped as hereinafter provided: Be it therefore enacted by the Queen's Most Excellent Majesty, by and with the advice and consent of the Lords spiritual and temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

I. In construing this Act, the word "meter" shall mean gas-meter, and shall include every kind of gas-meter or other machine used for measuring gas.

II. After the expiration of twelve months from the passing of this Act, the standard or unit of measure for the sale of gas by meter shall be the cubic foot containing 62·321 pounds avoirdupois weight of distilled or rain water, weighed in air at the temperature of 62° of Fahrenheit's thermometer, the barometer being at 30 inches, except as relates to contracts made before the passing of this Act, by which a different measurement is adopted, so long as such contracts continue in force.

III. Within three months next after the passing of this Act, models of gas-holders measuring the said cubic foot and such multiples and decimal parts of the said cubic foot as the Lord High Treasurer or the Commissioners of Her Majesty's Treasury of the United Kingdom for the time being shall judge expedient, and from time to time after the expiration of the aforesaid period of three months, models of such further multiples and decimal parts of the said cubic foot as the Lord High Treasurer or the said Commissioners shall from time to time think expedient, shall be carefully made, with proper balances, indices, and apparatus for testing the measurement and registration of meters, and such models shall be verified under the direction of the Lord High Treasurer or the said Commissioners; and, when so made and verified, shall be deposited in the office of the Chamberlain of the Exchequer at Westminster, and copies of the models so from time to time deposited, verified as aforesaid, shall be sent to the Lord Mayor of London and the chief magistrate of Edinburgh and Dublin, and to the chief magistrate of such other cities, and to such other places and persons in Great Britain and Ireland as the said Lord High Treasurer, or the aforesaid Commissioners, may from time to time direct.

IV. The Board of Trade shall from time to time appoint such competent persons as they think fit, not being makers or sellers of meters, to be inspectors of meters, and shall appoint a separate district for every such inspector, and may from time to time suspend or remove any such inspector, and may from time to time alter or subdivide any district, and assign a part or parts of such district to another inspector or other inspectors; and every such inspector shall examine, test, and stamp all meters within his district by this Act required to be examined, tested, or stamped, and shall perform such other duties as are imposed upon him by this Act.

V. All gas-meters which shall be sold after the expiration of twelve months from the passing of this Act shall have their measuring capacity denominated, stamped, or marked on the outside of such meters, or the indices thereof, in legible figures and letters; and every person who, after the expiration of such twelve months, shall sell any meter, and part with the possession thereof before it has been so stamped, shall be liable to a penalty of five pounds.

VI. After the expiration of twelve months from the passing of this Act every inspector of meters appointed under this Act shall, at the requisition and expense of the manufacturer or owner of any unstamped meter, or of any purchaser or seller of gas by meter, examine, test, and stamp any unstamped meter within his district belonging to such manufacturer or owner, or by which the gas supplied to or by such purchaser or seller of gas is measured: Provided that every such purchaser or seller of gas shall, before removal of any such unstamped meter for the purpose aforesaid, give not less than forty-eight hours' notice in writing of such intended notice to the other party to the contract.

VII. Provided always, that no such meter as aforesaid shall be stamped which shall be found by the inspector of meters to register quantities varying more than two per centum from the standard measure of gas; and every meter, whether stamped or unstamped, which shall be found upon examination by the inspector of meters to register quantities varying more than two per centum from the standard measure of gas shall be deemed an incorrect meter within the meaning of this Act.

VIII. It shall be lawful for the inspector of meters for any district, being authorized in writing under the hand of any justice of the peace in England, Wales, or Ireland, or of any sheriff, justice, or magistrate in Scotland, and he is hereby required, at the request and expense of any buyer or seller of gas, who shall have given forty eight hours' notice in writing to the other party to the contract, at all seasonable times to enter any house or shop, store, warehouse, still, yard, or place whatsoever, within his district, where any meter, whether stamped or unstamped, shall be fixed or used, and to examine and test the same with the copies of the said standard meters required or authorized to be provided under this Act, and if necessary for such purpose to remove such meter, doing as little damage thereby as may be; and if upon such examination and testing it shall appear that any such meter is an incorrect meter, the same shall be removed by and at the expense of the party to whom it belongs; or, if already removed for the purpose of examination, shall not be refixed or used again unless and until it has been altered and repaired so as to register correctly, and has been duly stamped or re-stamped, as the case may require, according to the provisions of this Act.

IX. If any person shall knowingly cause any stamped meter to be repaired or altered so as to register unjustly or fraudulently, or shall prevent or not allow lawful access to any meter in his possession or control, or shall in any way obstruct or hinder any examination or testing authorized by this Act of any such meter, he shall, on conviction, forfeit a sum not exceeding five pounds, and shall also, in addition, be liable to pay all fees and expenses which may be incurred in or about the examination, testing, and removing of such meter, and the purchase and fixing of a new meter: Provided always, that the payment of any such penalty as aforesaid shall not exempt the person paying the same from liability to indictment or other proceeding at law to which he would otherwise be liable, or deprive any person of the right to recover damages against such person for any loss or injury sustained by the act or default of such person.

X. If any inspector of meters appointed under this Act shall be required to examine and test any meter within his district pursuant to the provisions of this Act, and shall refuse or for
after having been so required shall without lawful excuse neglect to examine or test such meter, or shall refuse or for
after being required shall neglect to stamp any meter within his district which shall not have been found by him to be an incorrect meter, or shall stamp any meter knowing it to be an incorrect meter, he shall for every or any such default be liable to a penalty of ten pounds.

XI. Whenever any inspector of meters appointed under this Act refuses to stamp any meter at the request of the owner or manufacturer of such meter, or of the consumer or seller of gas to be measured thereby, he shall, if required, give to such owner, manufacturer, consumer, or seller, in writing, his reasons for refusing to stamp such meter; and if the owner or manufacturer of any meter, or the consumer or seller of gas to be measured thereby, shall be dissatisfied with the decision of any inspector as to the sufficiency of such meter to register correctly according to the provisions of this Act, he may require such meter to be re-examined and tested in the presence of an arbitrator to be agreed upon between him and the inspector, or, if they cannot agree, in the presence of three arbitrators, one to be appointed by each of the parties in dispute, and the third by the other two arbitrators, and the decision of such arbitrator or arbitrators shall be final as to the sufficiency of such meter, and the costs of the inquiry shall be in the discretion of the arbitrator or arbitrators.

XII. The following rules shall be observed in testing any meter under the provisions of this Act:—

The meter to be tested shall be fixed on a level base, and shall be tested at five-tenths pressure with the number of lights it is constructed for, and no more, each light consuming six feet per hour.

If the meter be a water meter (that is to say, a meter in which the capacity of the measuring-chamber is regulated or adjusted by means of water or any other liquid), it shall be tested at the correct water-level, and at the highest and lowest levels at which gas can be obtained.

If the meter be a dry meter (that is to say, a meter in which the capacity of the measuring-chamber is not regulated or adjusted by means of water or any other liquid), it shall be tested whilst consuming only two feet per hour at three inches pressure.

Every meter shall be allowed to pass if not more than two per cent. incorrect.

XIII. Every inspector of meters appointed under this Act shall be entitled to the following fees for examination and testing, with or without stamping meters; that is to say, sixpence for each meter delivering a cubic foot of gas in four or more revolutions, vibrations, or complete repetitions of the action of the meter, and one shilling for each meter delivering a cubic foot of gas by any less number of revolutions, vibrations, or complete actions, or one revolution, vibration, or complete action; and for each meter delivering more than one cubic foot of gas by one revolution, vibration, or complete action, the further sum of one shilling for every cubic foot of gas delivered at one revolution, vibration, or complete action beyond the first cubic foot.

A BILL TO REGULATE THE PROCEEDINGS OF GAS COMPANIES AND OTHERS, SUPPLYING THE METROPOLIS WITH GAS.

(*Introduced by Sir John Shelley, Mr. J. Locke, and Mr. Ayrton.*)

[The words printed in *italics* are proposed to be altered in committee.]

Whereas the following gas companies, that is to say:—"The Gaslight and Coke Company," "The City of London Gaslight and Coke Company," "The Commercial Gas Company," "The Equitable Gas Company," "The Great Central Consumers' Gas Company," "The Metropolitan Gaslight and Coke Company," "The Independent Gaslight and Coke Company," "The London Gaslight Company," "The Phœnix Gaslight and Coke Company," "The Ratcliff Gaslight and Coke Company," "The Surrey Consumers' Gaslight and Coke Company," "The South Metropolitan Gaslight and Coke Company," "The Western Gaslight Company, Limited," "The Mitcham Gas Company," "The Imperial Gas Company," "The Crystal Palace District Gas Company," "The Wandsworth Gas Company," "The Woolwich Consumers' Gas Company," "The Woolwich Equitable Gas Company," "The Brentford Gas Company," or some of them, are severally incorporated, under the authority of Parliament, for the purpose of supplying the several districts of the metropolis with gas.

And whereas such companies, or some of them, have, until recently, acted in competition with each other.

And whereas, during the continuance of such competition, the consumers of gas were protected from exorbitant charges.

And whereas, for some time past, such of the several companies above-named, as competed with each other in the same district, have ceased so to compete; and the companies above enumerated, or some of them, have agreed to divide the metropolis into districts; and each of such companies, under such agreement, is to confine its operations to the district so agreed to be allotted to it, and thereby to prevent future competition.

And whereas it will be for the advantage of the public that the said gas companies, and all other gas companies hereafter to be formed, and other persons supplying gas to the public in the metropolis, should so confine their operations to particular districts, but it is also necessary, for the protection of the consumers of gas therein, in the metropolitan districts, that in any metropolitan district or districts, which shall be unable (whether by arrangement between the gas companies, or any of them, or otherwise) to obtain a supply of gas, except from one company or person exclusively, or

from several companies or persons acting together, that the company or companies, person or persons, so exclusively lighting such district or districts, should conduct their business under, and subject to, the parliamentary regulations following: Be it therefore enacted, by the Queen's most excellent Majesty, by and with the advice and consent of the Lords spiritual and temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

PRELIMINARY CLAUSES.

I. In citing this Act in other Acts of Parliament, or in legal instruments or proceedings, it may be cited as "*The Metropolis Gas Regulation Act*, 1859."

II. The expression "the company," or "the companies," in this Act, shall mean the companies above enumerated, or the persons by any future special or general Act of Parliament authorized to construct gas-works, and to supply gas to any part of the metropolis. The expression "the undertaker," or "the undertakers," shall mean any person or persons, not being an incorporated company, who shall actually construct gas-works, and supply any part of the metropolis with gas, as a trade or business; and also any person or persons who shall take or purchase gas from any of the said companies, and retail the same; the expressions "the metropolitan districts," or "the metropolis," shall mean and extend to all the districts over which the Act passed in the eighteenth and nineteenth years of the reign of Her present Majesty, chapter 120, entitled "An Act for the better Local Management of the Metropolis," extends; and the expression "consumer," shall mean the person or persons using the gas of the company, or undertaker. The word "street," shall include any square, court, alley, highway, lane, road, thoroughfare, or public passage or place, within the limits of the metropolis; the expression "the gas-works," shall mean the gas-works, and the works connected therewith, constructed, or authorized to be constructed, by the said companies, undertakers, or persons; and the expression "gas-rate," shall include any rent, reward, or payment, to be made for a supply of gas.

III. This Act shall apply to, and include the companies above named, and any other company or companies, either now or hereafter formed, for lighting any part of the metropolis with gas, and any person or persons, whether being a company or not, who shall, in fact, erect public gas-works, for supplying gas to any part of the metropolis, as a trade or business; and the limits of the several districts to which this Act shall apply, shall be, as to companies now existing, the limits prescribed to each company in Schedule I. to this Act; and as to companies hereafter existing, the limits shall be those defined by the special or general Act under which it shall conduct business; and as to any person or persons, not being companies, the limits within which he or they do now, or shall hereafter, actually supply gas to the public as a trade or business.

AS TO THE
CONDUCT OF THE BUSINESS OF COMPANIES AND UNDERTAKERS.

IV. The company, or the undertaker, supplying gas in any part of the metropolis, shall, at the expense of such company or undertaker, on being required by the owner or occupier of any public or private building, land, or premises, or any vestry, or other parochial board, or body, or any district board, or any trustees, commissioners, or person or persons having, or exercising, jurisdiction in, or over, any street, and having authority to contract for the lighting thereof, lay all necessary communication, service, and other pipes up to the premises, or along the said street to be lighted, to communicate with such company's or undertaker's mains, and furnish such owners, occupiers, vestry, board, body, trustees, commissioners, person or persons, as aforesaid, with a supply of gas for the purpose of being used in or on such building, land, premises, or street, at or after the rates hereinafter declared; and also shall (if so required by such owners, occupiers, vestry, board, body, trustees, commissioners, or person or persons) furnish such owners, occupiers, vestry, board, body, trustees, commissioners, person or persons, with one or more meters, as such owner, occupier, vestry, board, body, trustees, commissioners, person or persons, may require (not being more than *sixty*-light meters) for ascertaining the quantity of gas consumed, at such rents as are hereinafter specified and declared, so that any owner or occupier, (not being a vestry, board, trustee, commissioner, or other public body,) requiring such pipes to be laid, or such supply of gas, or such meter or meters, shall, if required in writing by the company or undertaker, before being entitled thereto, give to the company or undertaker such security for the payment of the expense of, and incident to, the providing and laying of pipes, and for the gas to be so supplied, and for such meter, as the company or undertaker, and the owner or occupier requiring to be supplied with gas, shall agree upon: Provided, That every private consumer of gas shall, upon request to that effect in writing, by the company or undertaker supplying the same, consume such gas by meter, to be marked by the inspector of meters, as hereinafter provided, before such meter is used; and every consumer may, if he thinks fit, provide his own meter.

V. Provided, That if the company or undertaker, and such owner or occupier, requiring such pipes, and gas, and meters, or any of them, cannot agree upon the security to be so given, the same shall be determined by any police or stipendiary magistrate, acting in and for the metropolis; and any such magistrate shall, on the complaint and application of the company or undertaker, or of the owner or occupier, requiring to be supplied as aforesaid, or of both parties jointly applying, determine the nature and amount of the security to be given, and such security may be the deposit with the company or undertaker, or with any other person or persons to be nominated by the said magistrate, or may be the pre-payment to the company or undertaker, of a sum of money; and the decision of such magistrate, upon any matter provided for, or within the meaning of this clause, shall be binding and final.

VI. If the company or undertaker shall, after such magistrate, as aforesaid, shall have settled and decided the amount and nature of the security to be so given, and after such security shall have been given or tendered to the company or undertaker, wilfully fail, for *three* days; or if the company or undertaker, not having required, or not being entitled to require, any security, shall wilfully fail, for *three* days after being required, in writing, to provide and lay communication, service, or other necessary pipes, and to furnish a supply of gas, and a meter or meters, pursuant to the provisions of this Act, in any such case the company or undertaker shall forfeit and pay to the owner, occupier, vestry, board, body, trustees, commissioners, person or persons, so requiring to be supplied with gas, the sum of *forty* shillings for every day after the expiration of the said *three* days, during which such failure shall continue.

VII. Provided, That the company or undertaker may from time to time enter into any special contract with any such person or persons as are in this Act described as entitled to be supplied with gas, for supplying such person or persons with gas, and with pipes, burners, meters, lamps, and lamp-posts, and for the repair thereof, in such manner, and upon such terms, as shall be agreed upon between such company or undertaker, and such person or persons; and any contract entered into under this clause, shall be binding as against any company whose contracts are by the special Act of such company, or otherwise, required to be under seal, if such contract shall be signed by any *two* directors of such company, or by the secretary thereof, by the authority of any *two* directors, although such contract may not have the corporate seal of such company affixed to it: Provided, That any clause in any such special contract, inconsistent with the regulations hereinafter contained as to meters, or giving, in any case of dispute, the sole arbitrament of such disputes to the company or undertaker, or requiring any notice by a consumer of gas of discontinuing his supply, which shall have the effect of making him liable to pay more than *one fortnight's* rate for gas, or rent for any meter, from the time of the service of such notice, or which shall entitle any company or undertaker to discontinue any supply of gas (except for any breach of the provisions of this Act), with less than *two* clear months' notice, in writing, to the consumer, shall be utterly null and void.

VIII. In all cases in which the company or undertaker is, or shall be, authorized by any special Act, or otherwise, to cut off and take away the supply of gas from any premises, then, if such premises be unoccupied, the company or undertakers, their agents, servants, or workmen, after giving *twenty-four* hours' previous notice to the owner or his agent, by serving the notice on him; or if the owner, or his agent, be not resident within *seven* miles of such premises, or be not known to the company, by affixing the same notice for *three* days on some conspicuous part of such premises, may enter into the same, between the hours of *nine* in the forenoon, and *four* in the afternoon, and remove and carry away any pipes, or fittings, or other works, being the property of the company or undertakers.

REGULATIONS AS TO THE QUALITY AND PRESSURE OF THE GAS.

IX. The quality of the gas to be supplied by any company or undertaker, shall be, as regards its illuminating power, such that an argand burner having *fifteen* holes, and a *seven*-inch chimney, consuming *five* cubic feet of gas per hour, shall give a light equal to the light of *twelve* sperm candles, of *six* in the pound, each burning *one hundred and twenty* grains per hour; and the gas so to be supplied shall be free from ammonia, bisulphide of carbon, sulphuretted hydrogen, and other agents deteriorating its quality, or its illuminating capacity.

X. A pressure of not less than *ten*-tenths, or *one* inch head of water, shall be maintained at all times on the service-pipes of the company or undertaker, within the premises of the consumer.

XI. Every vestry, or other parochial board, body, or district board, and every body of trustees or commissioners, and every person, or body of persons, having authority to contract for lighting any public streets, or *two* or more such vestries, boards, or two or more of such bodies of trustees or commissioners, or two or more such persons or bodies of persons combining, shall provide and erect all proper apparatus, machinery, and instruments for testing the pressure, quality, and illuminating power of the gas, and shall appoint from time to time, and pay out of any fund applicable by them for parochial purposes, a chemical examiner, or gas engineer, or other competent person, who shall, as often as may be necessary (or as often as he shall be directed by the person or persons appointing him), examine the quality, the illuminating power, and the pressure of the gas so supplied by any company or undertaker, and shall present to the person or persons appointing him, as often as such person or persons shall direct, a report, stating the number of examinations on which such report is founded, and the maximum, minimum, and average quality, illuminating power, and pressure, or the quality, illuminating power, and pressure from day to day, or at longer intervals, of the gas supplied during the whole period to which such report shall relate.

XII. If at any time complaint as to the purity, illuminating power, or pressure, of the gas supplied by any company or undertaker, shall be made by any consumer or consumers, to the Metropolitan Board of Works, or to any of Her Majesty's superior courts of law or equity, it shall be lawful for the said Metropolitan Board of Works, or for such court of law or equity, at any time within *one* month after such application, to appoint a competent person to inquire into and examine the matter of such complaint, and to report to the said Metropolitan Board of Works, or to such court, thereupon; every such complaint, as aforesaid, to the said Metropolitan Board of Works, shall be by memorial, in writing; and the same, if made by any vestry or other parochial body, or by any other public body, shall be signed on behalf of such body, by the solicitor of such body, or by the clerk thereof, or by such other person as, for the time being, shall be legally authorized to give, or shall, by custom, usually have given notices on behalf of such body; and if such complaint be made by any private person or persons, the same shall be signed by the person, or by all the persons, making the complaint.

XIII. Any person or persons so complaining to the said Board of Works shall immediately upon delivering such memorial as aforesaid, serve a copy thereof on the company or undertaker complained of, and the company or undertaker may, if they shall think fit, within *seven* days from the service of such memorial, deliver to the said Board of Works an answer thereto in writing, and the said Board of Works, upon receiving such answer, or at the expiration of seven days from the receipt of the memorial of the complainant, if, in the meantime, no answer thereto shall have been made, appoint such person, as hereinbefore mentioned, and may, in the order appointing such person, give to him any special directions, as it shall thing fit.

XIV. Any such complaint as aforesaid, made under this Act to any court of law or equity, if made by any parochial or other public body, shall be made on behalf of such body, in the name or title by which such body is usually designated in legal instruments; and if made by any private person or persons, in the name or names of such private person or persons; and any application so made to any court of law or equity, shall be made by motion, upon *two* clear days' notice to the company or undertaker, and upon such motion, evidence may be given by either party in open court, either by affidavit, or orally, or in both ways, as either party shall think fit.

XV. And on such motion, the provisions of the Act passed in the twenty-first and twenty-second years of the reign of Her present Majesty, chapter 27, entitled 'An Act to amend the course of procedure in the High Court of Chancery, the High Court of Chancery in Ireland, and the Court of Chancery of the County Palatine of Lancaster," shall be applicable thereto. The court in which any such motion, as aforesaid, is made, may, on hearing the same, give any special directions to the person appointed, as it shall think fit; or may, before making any order appointing any person, direct any such further inquiries to be made before any officer of the court or otherwise, as it may think fit, and shall have all the powers and authority, in respect to making any order upon and over the parties to such motion, in all respects, which it has in respect to motions made in causes in the same court; and service of any notice of motion, or of rule or order made thereupon on the solicitor of the company or undertaker, or upon the secretary of any company, or by leaving such notice, rule, or order at the principal office or place

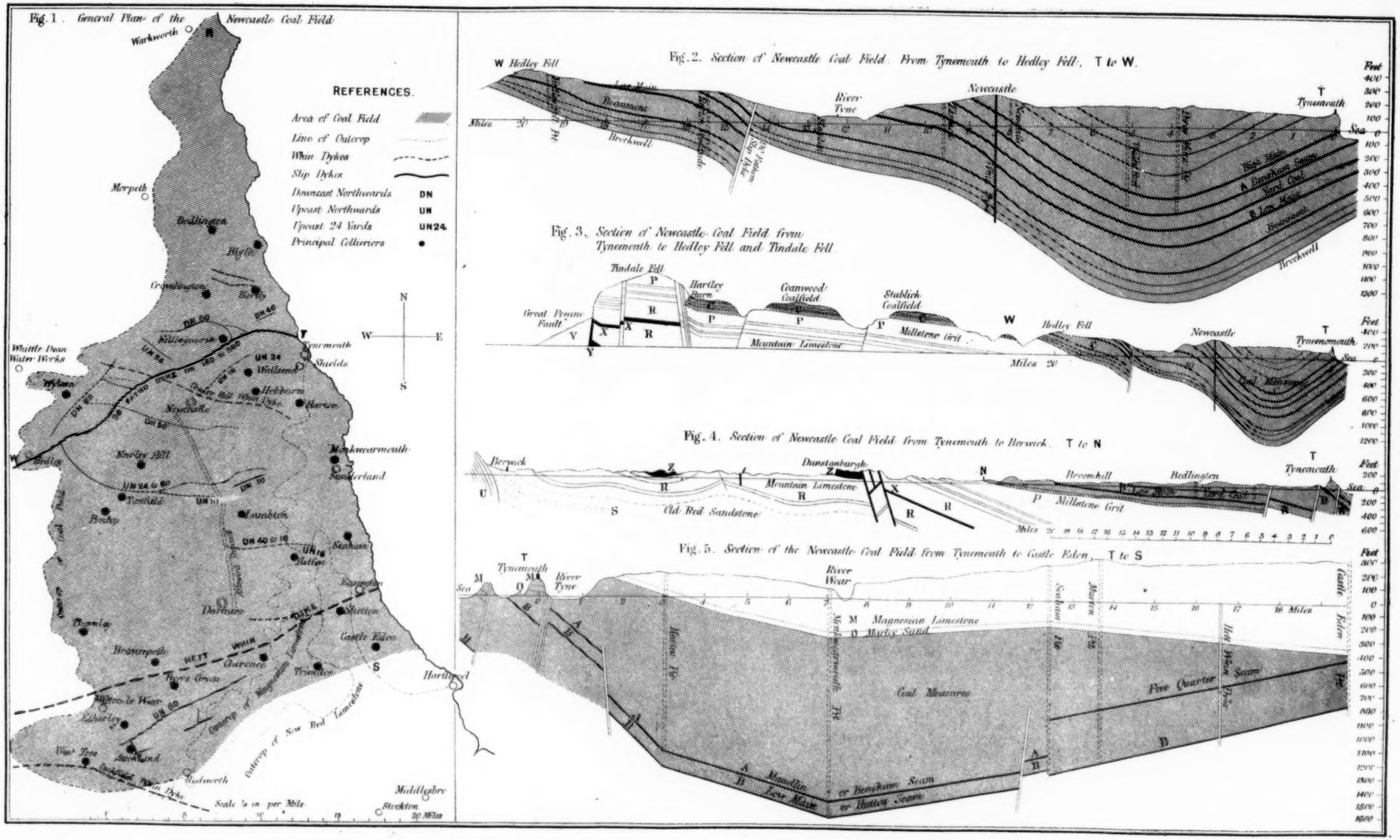
Fig. 1. General Plan of the Newcastle Coal Field
REFERENCES.
Area of Coal Field
Line of Outcrop
Whin Dykes
Slip Dykes
Downcast Northwards DN
Upcast Northwards UN
Upcast 24 Yards UN24
Principal Collieries
Warkworth
Morpeth
Bedlington
Blyth
Cramlington
Whitley
Tynemouth
Shields
Wallsend
Hebburn
Jarrow
Newcastle
Morpeth Hill
Monkwearmouth
Sunderland
Tanfield
Hamsterley
Bishop
Stanley
Butler
Durham
Burnhope
Hetton
Castle Eden
Trimdon
Brancepeth
Quarrington
Tow's Green
Wheatley Hill
Thornley
Wingate
Hartlepool
Whitwell Wood
Liberley
West Tees
Auckland
Outcrop of New Red Sandstone
Outcrop of Magnesian Limestone
Whin Dyke
Hesleworth
Middlesbro
Stockton
Scale 4 in. per Mile
20 Miles
Fig. 2. Section of Newcastle Coal Field. From Tynemouth to Hedley Fell. T to W.
W Hedley Fell
Low Main
Beaumont
Brockwell
River Tyne
Newcastle
T Tynemouth
Sea
Fig. 3. Section of Newcastle Coal Field from Tynemouth to Hedley Fell and Tindale Fell
Tindale Fell
Great Penine Fault
Hartley Barn
Coanwood Coalfield
Stublick Coalfield
Mountain Limestone
Millstone Grit
Hedley Fell
Newcastle
Tynemouth
Miles 20
Fig. 4. Section of Newcastle Coal Field from Tynemouth to Berwick. T to N
Berwick
Dunstanburgh
Old Red Sandstone
Mountain Limestone
Beacombill
Bedlington
Millstone Grit
Fig. 5. Section of the Newcastle Coal Field from Tynemouth to Castle Eden. T to S
River Wear
River Tyne
Magnesian Limestone
Marls Sand
Coal Measures
Five Quarter
Hutton Seam
Castle Eden
Miles
Feet

of business of any company or undertaker, shall be good service on such company or undertaker.

XVI. The person appointed, as aforesaid, to examine into any such complaint, as aforesaid, shall, immediately upon his appointment, have power to inspect and examine the works of the company, or undertaker, and to inquire into and concerning the grounds of the complaint, and shall make a report thereon, in writing, to the Metropolitan Board of Works, or to the court, as the case may be; and the company, or undertaker, and their respective officers, shall afford all reasonable facilities for such inspection, examination, and inquiry; and shall have power to call for all books, papers, and writings, and other documents relating to the subject of inquiry; and any person obstructing such examiner in the reasonable prosecution of such inspection, examination, or inquiry, shall forfeit and pay for every such obstruction a sum not exceeding *ten* pounds: Provided, That nothing herein contained shall invalidate or prejudice the right of the person or persons who shall have obtained the appointment of such examiner, by the order of any court of law or equity, from proceeding by way of contempt, according to the practice of such court, against the company or undertaker, in respect of any such obstruction of the examiner, as shall be a contempt of any such order made by such court, or of any order made in the matter by such court.

XVII. If, after the receipt of any report made by such examiner to the Metropolitan Board of Works, or to any court of law or equity, it shall appear to the said board, or to such court, that the complaint of the person or persons complaining, or any part thereof, is well founded, the said board, or such court, shall make an order declaring that such complaint, or such part of it, is well founded, and ordering the company or undertaker to pay any penalty or penalties thereby incurred, and to remove the grounds thereof within reasonable time, and in such order the said board, or such court, may order and direct such specific acts as it shall think fit to be done by the company or undertaker, for removing the grounds of complaint, or of so much of it as shall be declared in the order to be well founded: Provided, That before making any such order upon any company or undertaker, the said board, or such court, may direct notice to be given to the company or undertaker, and the complainant or complainants, to appear and be heard, at such time as the said board, or such court, shall appoint; and each party may thereupon appear and be heard before such board, or court, by themselves, their agents, attorneys, or counsel; such hearing of the matter shall, if before any such court of law or equity, as aforesaid, be treated as a continuation of the motion made, as aforesaid, for the appointment of an examiner, and the court shall have, in respect of such hearing, all the powers given to it by this Act, in respect of any motion so made for the appointment of an examiner, as aforesaid; and the order made on any such hearing, whether before the said Metropolitan Board of Works, or before any such court, as aforesaid, shall be final: Provided also, That any order so made by the said Metropolitan Board of Works, may, within *seven* days from the making thereof, be made a rule or order of any court of law or equity, by either party, upon an ex-parte application; and such order, on being so made a rule or order of court, shall have all the force, and all the consequences, that it would have had, if it had been originally made by the court of law or equity, upon hearing and adjudicating upon the whole matter.

XVIII. After being served with any order so to be made by the said board, or any court of law or equity, the company or undertaker shall, and they are hereby required, within the time stated in the order, to remove the grounds of so much of the complaint as shall in the order be declared to be well founded, and pay such damages and costs as shall be awarded.

XIX. If the gas supplied by the company or undertaker shall at any time be of a less illuminating power than the same ought to be (the standard of such illuminating power being the standard hereinbefore mentioned), or shall not be free from ammonia, bisulphide of carbon, sulphuretted hydrogen, and other agents deteriorating its quality, the company shall forfeit, for every such offence, the sum of *one hundred* pounds; and also, in addition to the said penalty of *one hundred* pounds, and whether such penalty shall have been received or not, the sum of *ten* pounds for each day after notice in writing from any vestry, district, or other board, trustees, or commissioners, having by law the control, direction, or management of the lighting of any parish or place, within the limits of the district lighted by such company or undertaker, during which any or either of such offences shall continue.

XX. For the purposes of this Act, all powers and duties vested in the Metropolitan Board of Works may be exercised and performed at any meeting of such board, at which not less than *nine* members of the board are present; and at any such meeting, all questions shall be determined by the votes of the majority of the members present, and such board may act, notwithstanding any vacancies therein, and notwithstanding any omission to elect any member or members of such board, in pursuance of the Act of Parliament passed in the eighteenth and nineteenth years of the reign of Her present Majesty, entitled "An Act for the better Local Management of the Metropolis."

REGULATIONS AS TO METERS.

XXI. It shall be lawful for the Metropolitan Board of Works to appoint from time to time, and to remove at pleasure, one or more fit and proper person or persons to be inspector or inspectors of meters, for the purposes of this Act; and every such inspector shall be paid a salary or allowance, of such amount, and to be paid by the several companies and undertakers for the time being supplying gas to the metropolis, in such proportions as the said Board of Works, and the said several companies and undertakers, shall agree upon; and in case of the said Board of Works, and companies, and undertakers, not agreeing upon the amount of the said salary, or the proportions in which the same is to be paid by the several companies and undertakers, the amount of the said salary, and the proportions to be borne by each company and undertaker, shall be determined by the chairman of the said Board of Works for the time being, and his determination in the matter shall be final and conclusive.

XXII. Every inspector so appointed shall have power, at all reasonable times, to enter upon the works of the company or the undertaker, and also at all reasonable times, but with the consent of the occupier thereof, to enter upon any house, building, or place supplied by such company or undertaker, for the purpose of inspecting any meter or meters, either on the premises of such company or undertaker, or of any gas consumers; and whether such meter or meters shall be the property of the company or undertaker, or of the consumer; and, if he shall think it necessary, shall have power to order the company or undertaker, or gas consumer, to remove any such meter or meters, and to substitute another or others in lieu thereof, and shall have power to open and inspect any such meter or meters, and to test the correctness of the same by any such experiments as the said inspector shall think fit, if he shall think it necessary, shall have power to remove any such meter or meters to any other place or places, for the purpose of more conveniently testing and examining the same, doing no unnecessary damage to such meter or meters; and every such meter which the inspector shall condemn as being incorrect, or order to be removed, shall be removed by the company, undertaker, or other person whose property it is, and shall be replaced by a new one, at the expense of the company or undertaker, or of the consumer, or other person, as the case may be, whose property it is; and every meter on the premises of any company or undertaker (except such meters as such company or undertaker shall be using for the registry of gas consumed by themselves, or for experimental purposes) which shall be declared incorrect by the said inspector, shall be marked by him with some clear and special mark as incorrect, and condemned, and no company or undertaker shall thereafter supply any such meter so marked, to any consumers of gas; and if any company or undertaker shall, by themselves, or their servants or agents, obstruct such inspector in his duties hereby authorized, such company or undertaker shall, for every such offence, forfeit a sum not exceeding *forty* shillings.

XXIII. From the expiration of *six* months from the passing of this Act, no meter shall be supplied by the company or undertaker to any consumers of gas, nor shall any meter be used by any consumer, until the same shall have been inspected and tested, and some clear special mark, indicating that such meter is approved, shall have been affixed or put thereon by such inspector as aforesaid; and such fees shall be paid by the company or undertaker, or consumer, to the said inspector, for testing and marking every meter to be supplied by them, as the said Metropolitan Board of Works shall fix; but any company or undertaker may, in respect of any meter, whether the property of the company or undertaker, or of the consumer, and any consumer of gas may, in respect of any meter affixed on his premises, have such meter tested, at any time or times by such inspector, and such inspector shall have power to remove the same, and shall inspect the same, on being required so to do, at any time or times, upon payment to the said inspector of the same fee as he would be entitled to on testing a meter for any company or undertaker, before the same is affixed: Provided, That any meter which shall be found by the inspector to be incapable of being made to register falsely, at the rate of more than *two* per cent. upon the quantity of gas passing through the meter, may be declared by him to be correct and approved, and marked accordingly.

AS TO PRICES OF GAS AND METERS.

XXIV. Any company or undertaker may charge for gas, the illuminating power of which, from a *five* feet burner, does not exceed that of *eighteen* sperm candles, each burning *one hundred and twenty* grains per hour, any sum not exceeding *four* shillings and *six* pence per *thousand* cubic feet, and no more: Provided, nevertheless, That if any company or undertaker shall supply gas of a higher illuminating power than as last aforesaid, they may charge for the same any sum not exceeding *six* shillings per *thousand* cubic feet; but the company or undertaker shall not be entitled to make such higher charge, without giving first to the consumer *three* months' notice of their intention to do so.

XXV. Every company or undertaker supplying *one* or more meters to any consumer, may charge for the use of such meters, by way of rent, at the rates following, that is to say:—

XXVI. Provided that for any meter less than a *one hundred* light meter, but not being one of the meters above specified, the company or undertaker may charge a rent proportionate to the rents above specified: Provided, That no company or undertaker shall be bound to supply any meter exceeding a *sixty*-light meter, and that every such company or undertaker supplying a meter exceeding a *one hundred* light meter, may charge for the same, by way of rent, *twelve and a half* per cent., and no more, on the cost to the company or undertaker of such meter; and any special contract for charging more than *twelve and a half* per cent., so computed upon a meter exceeding a *one hundred* light meter, shall be utterly null and void.

XXVII. In case any consumer shall leave the premises where gas shall have been supplied to him, without paying the company or undertaker for such gas, or for the rent of any meter, it shall not be lawful for the company or undertaker to require from the next tenant of such premises payment of the gas-rate, or of the meter-rent left unpaid by the former tenant, unless such incoming tenant shall have undertaken with the former tenant, to pay the rate or rent due to the company or undertaker, left unpaid by him; but the company or undertaker shall supply their gas to such incoming tenant, upon the ordinary terms prescribed by this Act, upon being required to do so by such incoming tenant: Provided, That every person consuming gas, and using a meter, shall be liable for gas-rate and meter-rent, for any fractional part of the period at which the payments are due, or made by custom to the company or undertaker supplying the same, during which he shall have so used gas, or a meter: Provided also, That if any meter shall, from any cause whatever, cease wholly to register for any time, or shall be found in examination to register against the consumer, so that the amount fairly due for gas consumed during such time cannot be ascertained, then, if any dispute shall arise between the company or undertaker, and the consumer, as to the amount to be paid for gas during such time, such dispute shall be referred to, and be determined by, any police or other stipendiary magistrate, acting in and for the district within which such dispute shall arise.

XXVIII. The company or undertaker shall, and they are hereby required, well and effectually to light all public lamps, in all streets which they may be required by any vestry, district board of works, trustees, commissioners, or other persons, having, or exercising, jurisdiction in or over such streets, to light; and it shall not be lawful for the company or undertaker to charge a higher price for the gas consumed by such lamps, per one thousand cubic feet, than the lowest price charged by such company to private consumers, in that part of the parish or district in which the lamps are situate; and if any dispute shall arise between the company or undertaker, and any vestry, district board, or other public board, trustees, commissioners, or person or persons, as to the rate or rent to be charged for such lighting, the question in dispute shall be settled by arbitration, in the manner prescribed in "The Lands Clauses Consolidation Act, 1845," with respect to the purchase and taking of lands otherwise than by agreement; and for the purpose of any arbitration under this clause, the twenty-fifth to the thirty-seventh clauses of the said Act, both inclusive, shall be, and the same are, hereby incorporated in this Act: Provided always, That the company or undertaker shall not be required or compelled to light any street with lamps at a greater distance from each other, measured in a line on each side of the street parallel to the direction of the same, than *one hundred* yards.

XXIX. Every company shall, within *one* year after the passing of this Act, cause a map to be made of the district within which any mains, or district mains, shall have been laid down or formed by them, on a scale not less than *six* inches to a mile, and shall cause to be marked thereon the course, situation, and diameter of all existing mains and district mains; and shall, within *six* months from the making of any alterations or additions, cause the said maps to be from time to time corrected, and such additions made thereto as may show the line and situation, and also the diameter, of all such mains and district mains as may be laid down or formed by them from time to

time after the passing of this Act; and such map, or a copy thereof, with the date expressed thereon of the last time when the same shall have been so corrected as aforesaid, shall be kept in the principal office of each company, and shall be open to the inspection of all persons interested in the same within the said district, who shall be at liberty to take copies of, or extracts from, the same.

XXX. Every company, on the application of any person supplied with gas by such company, shall furnish to such person the particulars of any district main from which such person is supplied, together with the names of such streets through which such district main passes, and the commencement and termination thereof.

MISCELLANEOUS CLAUSES.

XXXI. It shall be lawful for any company or undertaker, who has, or shall have, power under any special Act, or any Act incorporated therewith, to break up the soil and pavement of streets and bridges within the metropolis, to construct (with the consent of the vestry or district board of the district in which such street is situate) permanent subways or tunnels under any streets through which such company or undertaker has, or shall have, power to lay mains and pipes; and also to construct gulleys, or vertical or inclined shafts, or entrances, in any part of such streets, into the subways, affording access to such subways, for the purpose of inspecting, removing, or relaying pipes, or for any purpose connected with the distribution of the gas, so as to avoid repeated disturbance of the soil and pavement of such streets; and for that purpose to construct, and carry into effect, any works, according to any plan which shall be approved by the engineer of such company or undertaker, and by the Metropolitan Board of Works, and shall be agreed to by such vestries and district boards aforesaid.

XXXII. Any vestry, district, or other parochial board, trustees, commissioners, or other person or persons authorized to contract for the lighting of any street, may erect and keep in repair their own lamp-posts and lamps, and light and extinguish the same, and defray the charges thereof; and the company or undertaker shall supply such vestries, district or other parochial board, trustees, commissioners, or persons, with gas for such lamps, charging for the gas only at the price or prices hereinbefore fixed.

XXXIII. It shall be lawful for the Metropolitan Board of Works to appoint, and such board shall, on the requisition, in writing, of any vestry, district, or other parochial board, trustees, or commissioners authorized to light any metropolitan district, appoint, in the month of *December* in every year, or at such other time in every year as the said board may deem convenient, having regard to the period of the year when any company or undertaker habitually makes up and passes its yearly accounts, *one* or more fit person or persons to examine and audit the accounts of the companies or undertakers, subject to this Act, for their preceding financial year; and every such auditor shall be paid by the company or undertaker whose accounts he shall audit, a sum not exceeding *three guineas* for every day that he shall be fully employed upon such audit, and also all such expenses as he shall be put to in auditing such accounts; and such company or undertaker shall lay before the auditor or auditors, at every such audit, the accounts of the company or undertakers, for the year preceding, accompanied by proper vouchers for the support of the same; and submit to his or their inspection all books, papers, instruments, and writings belonging to the company or undertaker, relating to their accounts; and such auditor or auditors shall audit the said accounts, and may examine any of the directors or officers of the company or undertaker, whom he or they shall think fit; and he or they is and are hereby empowered to summon before him or them any such director or officer, for the purpose of such examination; and for the purpose of such examination, any auditor may take the same upon oath, and for that purpose is hereby empowered to administer an oath to the person summoned; and any person liable to be examined under this section, and refusing to be examined, or to take the oath and be examined, shall be liable to a penalty of *ten* pounds.

XXXIV. If such accounts are not found correct or complete, they may be corrected and completed, and when the same shall be finally found correct and complete, the auditor or auditors shall sign the same, and shall publish the same at the expense of the company, or body of undertakers:—Provided, That if any auditor shall think fit to make any observation on any accounts produced to him, or on the mode of keeping accounts by such company or undertaker, he shall have authority to subjoin such observation to the account, and shall sign such observation, as well as the accounts: Provided also, That if any company or undertaker shall refuse or neglect to furnish such accounts and vouchers, as they are hereby required to furnish, for *one* month after being required to do so, in writing, by any auditor or auditors, the company or body of undertakers so refusing or neglecting, shall be liable to a penalty of *fifty* pounds for every day after the expiration of such month during which such refusal or neglect shall continue, and the amount of the penalty or successive penalties so incurred, shall be recoverable in any of Her Majesty's superior courts of law, at Westminster, at the suit of the said Metropolitan Board of Works, as and for liquidated damages, and the amount recovered shall be applied in the manner hereinafter generally directed as to penalties recoverable under this Act.

XXXV. If at any time the auditor shall report that any gas company or undertaker has earned, during the *five* years preceding the date of such report, as profits upon its capital, the respective dividends mentioned in Schedule II. to this Act, and that, whether the company or undertaker shall, during such *five* years, or any part thereof, have actually paid the full profits by way of dividends, or shall have paid part thereof by way of dividends, and added the residue thereof to capital, such company or undertaker shall thenceforth reduce the price of the gas to the consumers, to such sum per thousand cubic feet of gas, of the illuminating power hereinbefore prescribed, as the Metropolitan Board of Works shall fix; and shall supply such gas at such reduced price to the consumer, and shall continue to supply gas at such reduced rate, until the auditor shall report that the profits of the company or undertaker do not amount to so much as would, if paid by way of dividends, make a dividend of more than *ten* pounds in the *hundred* on each share, and upon the auditor so reporting, the company or undertaker shall be at liberty again to charge the price of *four* shillings and *six* pence per thousand cubic feet.

XXXVI. If it shall appear at any time to the Metropolitan Board of Works, that any of the provisions of this Act have been violated, or not complied with, on the part of any company or undertaker, or that such company or undertaker is acting in a manner unauthorized by law, irrespective of this Act, and if it shall appear to the said board that it would be for the public advantage that the company or undertaker should be restrained from so acting, or compelled to do any act for remedying the wrongful act done by it, the said board shall certify the same to Her Majesty's Attorney-General, and thereupon the said Attorney-General shall, if he shall be so advised, proceed by information, bill, or action, or other such proceeding, at law or in equity, as the case may require, to restrain such wrongful acting, or to compel the doing of such acts, as aforesaid, for remedying the wrongful acts.

XXXVII. Provided, That no such certificate, as aforesaid, shall be given by the Metropolitan Board of Works, until *twenty-one* days after they shall have given notice to the company or undertaker, in relation to whom they shall intend to give such certificate, of their intention to give the same; and such notice shall be in writing, and shall specify clearly the grounds of complaint on which the certificate is intended to be given, and no proceedings shall be taken under the authority hereby given to the said Metropolitan Board of Works, except within *one* year after the offence or offences specified in the certificate shall have been committed

XXXVIII. Provided, That no special remedy or provision for giving relief to any person, given by, or contained in, this Act, shall oust, prejudice, or diminish the general jurisdiction of any of Her Majesty's superior courts of law or equity, over, or in respect of, the acts or defaults in respect of which such special remedies or provisions are herein given or contained.

XXXIX. It shall not be lawful for any company or undertaker, or for any person, hereafter to erect any public gas-works for supplying gas as a trade or business, within the limits of the metropolis, without the consent, in writing, of the said Metropolitan Board of Works first had and obtained.

XL. Nothing in this Act contained shall avoid, prejudice, or impair any of the powers now exercised by, or vested in, the Metropolitan Board of Works, nor any powers by law vested in any vestries, or other parochial boards, within the metropolis, nor any powers now exercised or possessed in respect of the manufacture or supply of gas within the metropolis, by any railway company, or by any other person or persons making or supplying gas for his or their own use, and not making or supplying gas to the public as a trade or business; nor shall anything in this Act contained avoid, prejudice, or impair the validity of any existing contract, undertaking, deed, matter, or thing relating to the supply of gas, made and entered into, or done, before the passing of this Act, by and between any of the companies hereinbefore enumerated, or any other person supplying gas, and any person or persons consuming gas, which would, as affecting such company, or person or persons supplying gas, and such person or persons consuming gas, have been binding upon them respectively if this Act had not passed.

XLI. Every penalty or forfeiture imposed by this Act, the recovery and application of which is not specially provided for by this Act, shall be recovered, enforced, accounted for, and paid to the receiver of the metropolitan police district, and shall be apportioned in the same manner as penalties or fines, other than fines upon drunken persons, or upon constables for misconduct, or for assaults upon police constables, or directed to be recovered, enforced, accounted for, and paid and applied, by an Act passed in the third year of the reign of Her present Majesty, entitled, "An Act for regulating Police Courts in the Metropolis;" and every order or conviction of any of the police magistrates, in respect of any such forfeiture or penalty, shall be subject to the like appeal, and upon the same terms, as is provided in respect of any order or conviction of any of the said police magistrates by the said last-mentioned Act; and every magistrate by whom any order of conviction shall have been made, shall have the same power of binding over the witnesses who shall have been examined, and such witnesses shall be entitled to, in case the order, conviction, and appeal had been made in pursuance of the provisions of the said last-mentioned Act.

XLII. The costs, charges, and expenses of, and incident to, the applying for and passing of this Act, shall be borne and paid, in equal moieties, by the companies hereinbefore enumerated, and by the several vestries and district boards mentioned in Schedules A and B of the said Act, entitled, "An Act for the better Local Management of the Metropolis."

SCHEDULE.

I. Name of each company, and limits within which it is authorized and required to supply gas.

II. Amount of capital of each company, under proper heads, and showing the amount of dividend to which each kind of capital is entitled.

Legal Intelligence.

COURT OF EXCHEQUER.

WESTMINSTER, FRIDAY, JUNE 24.

(*Sittings in Banco, before the* LORD CHIEF BARON *and Barons* BRAMWELL, MARTIN, *and* WATSON.)

HILLS *v.* THE LONDON GAS COMPANY.

This was the day appointed for the further hearing of the arguments in this case. At the sitting of the court this morning,

Mr. MONTAGUE CHAMBERS, for the plaintiff, said he was sorry to say that he had received a letter from Sir Fitzroy Kelly stating that he was so unwell as not to be able to attend.

The LORD CHIEF BARON: Do both parties desire that the case should stand over?

Mr. CHAMBERS said he believed they were willing, but Mr. Bovill was also not present. He (Mr. Chambers) should mention to the court in his own defence and as a justification for not going on with the case, that Sir Fitzroy Kelly, within the last three or four days, communicated to him his desire to submit to the court that the best mode of proceeding would be that the case should be argued by one counsel—the senior counsel—on each side only. Until yesterday, when a consultation took place in his absence in another court, he (Mr. Chambers) was under the impression that that was the arrangement which had been agreed upon, otherwise he should have felt it his duty to have devoted some time to prepare for arguing the case on the question of the weight of evidence. He thought it right to mention this, as while, on the one hand, it would appear gross neglect on his part not to be prepared to go on, on the other it would be a waste of time for him now to do so, as his argument must necessarily be rambling and unsatisfactory.

The LORD CHIEF BARON: Do both sides agree to its postponement?

Mr. DENMAN said he had just sent to Mr. Bovill to ascertain whether he would consent to it.

Mr. CHAMBERS: Sir Fitzroy Kelly will be ready to-morrow.

Baron BRAMWELL: Here are five learned counsel for the plaintiff, and the case is not to be argued because one of them is ill. I really declare I thought there would be some catastrophe in this matter.

Baron MARTIN: At all events, I propose to unburden my mind about the nonsuit. I do not want that to go on.

Baron BRAMWELL: I do not know what are the probabilities in favour of five counsel on one side being all in a good state of health.

Baron WATSON: And four judges.

The LORD CHIEF BARON: As far as I am concerned, I can find plenty of work in other courts, and I think my brethren might fairly take the vacation to which they are entitled.

Baron BRAMWELL: I am not anxious to work, but I want to get rid of this matter. I have no wish for more of it next term.

Mr. WEBSTER (for the defendants): We are prepared to go on.

Mr. CHAMBERS: That is very cool, when their leader is not here.

Mr. DENMAN said he had communicated with Mr. Bovill, who would rather take time to consider the proposition.

After the court had consulted for a few minutes,

Mr. CHAMBERS said he did not know what to do. He certainly was not prepared to go on, and did not know whether his friend Mr. Grove was.

Mr. GROVE said he was not, as he was not present at the trial.

The LORD CHIEF BARON: Is there any objection on the other side to its going over?

Mr. WEBSTER: There is no objection on the part of the defendants.

Baron MARTIN: I am quite prepared to give judgment upon the nonsuit. I made up my mind last night that the rule must be discharged.

Mr. CHAMBERS: Still we must hear the court.

The LORD CHIEF BARON: We have intimated that that would be the opinion of the court.

Baron MARTIN: I have no doubt whatever that upon the evidence the judge could not have taken upon himself to stop the case. I suppose this is over now till next term.

Mr. CHAMBERS: Yes, my lord; it would be more convenient to let it stand over till next term.

GUILDHALL, WEDNESDAY, JUNE 29.

(*Before Baron* BRAMWELL *and Special Juries.*)

MILLER *v.* THE COMMERCIAL GAS COMPANY.

The declaration in this case stated that the defendants had contracted to fix a meter in the house of the plaintiff, and to supply it with gas, and that they had failed to do so, whereby the plaintiff had suffered loss. The defendants pleaded that they did not promise, and that the promise had been obtained by the fraud of the plaintiff.

Mr. O'MALLEY and Mr. HENRY JAMES were counsel for the plaintiff. Mr. KNOWLES and Mr. HONEYMAN represented the defendants.

It appeared from the evidence of the plaintiff that he keeps at Deptford and Whitechapel model lodging-houses, which are partly lodging-houses and partly coffee-shops. In January he took such a house in High Street, Poplar, and fitted it up for a similar purpose, one of the requirements being that it should be supplied with gas for the purpose of lighting, warming, and cooking. He accordingly communicated with the defendants' company, who demurred to supplying him on the ground that the gas bill for a house opposite, which belonged to the plaintiff's mother, and which had been sublet to a person named Lejeune, had not been paid. The plaintiff satisfied the company that he had nothing to do with that house, and they agreed then to supply him with gas. They accordingly put on the service-pipe. The plaintiff then let the house to a person named Wesley at £8. 15s. a week, the plaintiff to supply the gas and pay all taxes. Ultimately, the defendants refused to supply the gas until the arrears due on the house opposite, which had been let to Lejeune, were paid. The house was accordingly opened under great disadvantages, and the plaintiff had been unable to let it to Wesley on the terms agreed upon, simply keeping it open because it would be a disadvantage to close it altogether.

In his cross-examination the plaintiff stated that he had been a bankrupt. He denied that he owned the house opposite on which the arrears were due. In order to give Wesley a fair start, he had on the opening night sent him plenty of provisions, such as meat, pastry, &c., and he engaged the brass band to play before the house on the occasion, but as no gas had been laid on, the house had to be lighted up with candles, much to the amusement of all the little boys of the neighbourhood, who "chaffed" at the whole concern. (Laughter.)

Mr. KNOWLES: I have to ask you this question—How long before you were a bankrupt were you in the hulks?

Plaintiff: In 1841.

Mr. KNOWLES: Was that followed by a residence in Australia?

Plaintiff: Yes, a rather short one. (Laughter.)

Mr. KNOWLES: It seems not a visit of pleasure.

Plaintiff: Not at all. (Renewed laughter.)

Re-examined: I was sentenced in 1841, and returned in 1845. I memorialized the Home Office.

A witness was then called to prove he had been employed to put up the gas-fittings, and Lejeune swore that he had rented the house opposite from the plaintiff's mother, and that he alone was answerable for the taxes, including the gas bill.

The plaintiff was then recalled, with the view of testing the probable loss which he had sustained, and stated that his house at Deptford could make up 100 beds, which being let at 4d. per night, would produce £11 a week for beds alone. In addition to this there was the profit on breakfasts, &c.

This closed the plaintiff's case, on which

The learned judge directed a nonsuit, on the ground that there was no evidence of contract between the parties.

Nonsuited accordingly.

Miscellaneous News.

CITY OF LONDON COURT OF SEWERS.

GUILDHALL, TUESDAY, JUNE 28.

At the Ordinary Meeting of the Commissioners held this day—Mr. Deputy CHRISTIE in the chair,

The Improvement Committee brought up a report in which they stated that having considered the subject of the City Gas Company's Bill, they had determined to oppose it in committee of the House of Commons, and had directed the Remembrancer to prepare a petition to Parliament praying to be heard against the preamble and certain clauses therein.

The REMEMBRANCER read the petition, which, after reciting that a bill to incorporate the City Gas Company was now pending in the House of Commons, and after reciting also the various Acts of Parliament under which the Commissioners of Sewers are constituted the Board of Health for the City, contained the following allegations:—That the manufacture of gas in densely populated places is most prejudicial to the public health, and productive of various nuisances to the inhabitants of the district in which such manufacture is conducted; that the City Gas Company have been convicted of a nuisance in discharging refuse into the Thames, and that certain complaints have been made against them by the residents in the locality, and by the police on duty there. The petition therefore prayed that if the House should decide to incorporate the said company, they should not be permitted to continue the manufacture of gas within the City, as was proposed by their bill to be done. It alleged that the company incorporated in their bill the Gas-Works Clauses Act, by which they secured power to open the streets of the City without notice to, or consent of, the commissioners, and that they were by the said bill empowered to charge 6s. per 1000 feet for the gas supplied by them. It prayed, therefore, that if the bill should pass into law, the company might be restrained from charging a higher price than is at present charged in the City of London, and also that clauses might be inserted to protect the powers of the commissioners; to secure gas of a proper illuminating quality; for the appointment by the corporation or the commissioners of officers to test such quality; that the various restrictive clauses contained in the Great Central Gas Company's Act might be inserted in this bill, and finally that the commissioners might be heard by themselves, their counsel, or agents against the preamble, and such of the clauses as they deem objectionable.

Mr. ABRAHAM objected to that part of the petition which said—"The company are empowered to charge," and said the sentence should read—"They seek power to charge."

Mr. AITCHESON said if the bill passed they would be empowered to do so.

Mr. LLOYD said they would not, he supposed, exercise that power while the other company charged less.

The REMEMBRANCER said he did not know with what truth, but it had been said that the company did not insert that price themselves, and that it was put in by desire of the House of Lords.

Mr. ROSS inquired whether the clause was in the bill as introduced?

The REMEMBRANCER said it was not; it was inserted in the House of Lords.

A COMMISSIONER: Why oppose the preamble?

The REMEMBRANCER said it was necessary, because the continuing the manufacture of gas in the City was part of the preamble.

Mr. BARKLY wished to know whether the Remembrancer could give the court any idea as to how many thousand pounds the opposition would cost?

Deputy HARRISON thought it was undesirable to enter into that question, and at once moved that the petition be adopted.

Mr. PHILLIPS said he thought Mr. Barkly's was a very proper question to be answered.

Deputy HOLT said it would have been a very proper question when the subject was before them for discussion.

Mr. ABRAHAM considered that they could not enter upon it now. They had had two field days—the question had been fully debated—and it was hardly fair now to open the subject, and consider whether the opposition should or should not be conducted in such a way as to ensure a probability of success.

Mr. PHILLIPS repeated that, in his opinion, the question ought to be answered.

Mr. ROSS concurred, and added that as they were discussing the propriety of opposing the preamble, it might be as well to have that preamble read, so that they might know what they were asked to oppose.

Mr. BONE objected, and said that if there had been any wish to have the preamble read, it should have been done before the petition was agreed to.

Mr. LLOYD said the petition was not yet agreed to, and he would move that the preamble be read. He understood that the only objects they had in view were to regulate this company and to protect themselves against extravagant charges, and any inconvenience which might arise from giving this company a monopoly. But before the preamble was read he wished to know whether the chairman decided against Mr. Barkly's question being answered.

The CHAIRMAN said an answer had been given to it.

Mr. LLOYD said the question was asked, but no reply was given to it.

The CHAIRMAN said he understood the Remembrancer to say that it was impossible to tell.

Mr. BARKLY said, knowing as he did what the cost had been in the House of Lords, he was thoroughly satisfied that the expense of the opposition in the Commons would be five or six times that amount.

Mr. ABRAHAM: No, no.

Mr. BARKLY was persuaded it would, for the same rule applied to law as to physic—the cost depended upon the quantity taken.

Mr. ROSS said they seemed as though they meant to take a good dose this time.

Mr. ABRAHAM said the less they took the more they should be charged; for there was more science required in curing with a little physic than a great deal.

Mr. BARKLY said he should move "The previous question," as an amendment to the adoption of the petition.

Deputy HARRISON said his friend, Mr. Barkly, had asked what is the price of this law? Now, it was perfectly well known that it was impossible when a man began a law-suit to say what it would cost. It might be little or much. The truth of the matter was this—the question was before the committee on the previous day, and they were unanimously of opinion, that, in the present position of affairs, they ought to petition the House of Commons, so as to have a standing before them.

Mr. BARKLY supposed that at the committee there were only five or six present.

Deputy HARRISON said that supposition was like the previous one—that the commissioners were going to spend thousands in opposition. But he would read the names of those who were present. There were—the Chairman, Mr. Ross, Mr. Abraham, Deputy Harrison, Mr. Walter, Mr. De Jersey, Deputy Whiteside, Mr. Bone, Mr. Simmons, and Deputy Holt. This was as large a committee as he had seen for a long time; and they agreed that the only course which was open to them was to present this petition. He did not shut his eyes to the possibility of an arrangement being come to, by which the commissioners might secure all that was absolutely necessary for the public; but in order to do so, it was essential to present this petition, that they might have a standing before the House of Commons. He felt that it was undesirable now to go further into the matter—and, indeed, they could not do so without disclosing the evidence by which they intended to support their case. He would merely, therefore, say that he brought this forward as a business man, and he hoped a satisfactory result would be arrived at without expense. He could quite see that much good was to be done by negotiation; but to-day was not the day to begin it, and they were bound to place themselves in a position in which they would be able to protect the rights of the citizens.

Mr. BENGOUGH seconded the amendment.

The REMEMBRANCER read the preamble of the company's bill, and, after some further conversation,

The amendment was put and negatived, and the petition adopted by a considerable majority.

THE METER QUESTION IN FRANCE.

Le Gaz of the 20th ulto. contains an able article from the pen of M. Durand, pointing out the defects in the French system, and suggesting the following form of a decree for regulating the testing of gas-meters:—

Whereas gas lighting has made immense progress in France, and this mode of lighting is already adopted in upwards of two hundred towns, and is every day extending; and whereas the plan of selling gas to consumers

by calculating an average price, according to the duration of the lighting and the number of burners employed, is not more generally adopted than the plan of selling by measure, which is more rational and more in accordance with the general wants;

And whereas, although artificial illumination is one of the first necessities of civilized life, gas cannot be measured openly like other merchandise, but in closed vessels provided with a special mechanism for indicating the quantities measured, the accuracy of which apparatus ought to be determined with greater care, because the consumers are, for the most part, ignorant of the mechanism of an operation the details of which are hidden from sight, and they cannot ascertain the accuracy of the measured quantities delivered, since the consumption of the gas takes place as rapidly as it is supplied; it is therefore necessary that rigorous regulations should be adopted to afford them some guarantee for the regular and accurate action of the measuring instruments;

And whereas the "gas-meter," the invention of which is due to Samuel Clegg, of England, is an instrument generally used for measuring gas, and is the only legal indicator of the debt due by the consumer to the producer, and in that capacity it ought to be placed in the same category with weights and measures, and consequently subjected to all the prescriptions of the law of the 4th of July, 1837, and not to local provisions, the varying prescriptions of which are essentially repugnant to the principle of unity which constitutes the strength of the French law;

And whereas the verification of that instrument might easily be effected in any place lighted with gas, and the producer and consumer are equally interested in such verification; but it requires special apparatus, the fixing and working of which render portability impossible, and it is also requisite to compel all the manufacturers of meters, and also the directors of gas-works to possess, under the control of authority, the necessary apparatus for the verifications of these instruments;

And whereas it is possible to make fraudulent alterations in the meter, which would be the more fraudulent because concealed from sight; and improvements have been introduced in the manufacture of meters by which a constant water-level can be maintained in the apparatus, which is a *sine quâ non* to this accuracy; and that the plans for attaining that object are so numerous that no manufacturer in particular can claim the monopoly of such arrangement;

And whereas, though it is desirable to leave unrestricted the possible improvements in the different kinds of meters now in use, it is not less important to prevent the sale of apparatus constructed according to new plans which have not previously been well considered and undergone practical verification by the authorities;

And whereas, though originally the making of meters presented such difficulties that instruments which registered 1 per cent. more or less, as compared with the test-meters, were by sufferance allowed to be correct, that sufferance ought not to continue now that the manufacture has attained such a degree of perfection in the workmanship; and that on this account, as well as on other considerations, this apparatus should be regarded as a legally correct measure;

And whereas, finally, the regulations necessary to obtain the aforesaid effects have assumed general interest by the development of gas lighting in the French empire (see the Articles 3, 4, 5, 6, and 7 of the law of the 4th of July on weights and measures);

We have decreed and now decree as follows:—

ARTICLE 1. For the future, gas-meters shall be regarded as legal measuring instruments, and as such shall be subjected to all the prescriptions of the law of the 4th of July, 1837, on weights and measures. Consequently their indications shall be established according to the metrical system; that is to say, they shall indicate multiples or submultiples of a cubic mètre taken as unity of capacity in the apparatus made for measuring gas.

ARTICLE 2. Within two months from the promulgation of this decree, all the meters the indices of which are according to the old French measures, or to foreign measures, shall be altered so as to indicate only cubic mètres.

ARTICLE 3. The administration of weights and measures in every town lighted with gas shall give instructions in this respect to all their agents, so that they may proceed to the inspection, verification, and stamping of the meters according to that plan.

ARTICLE 4. No gas-meter intended to be used in any French territory shall leave the manufacturer's premises without having been previously subjected to inspection, verification, and stamping by the inspectors or agents commissioned by the administration of weights and measures to make such examination.

ARTICLE 5. The object of this verification shall be to determine—

1. If the meter be constructed on an approved plan, as stated in the subjoined 14th article.
2. If the different parts composing the clock mechanism are properly combined, so as to indicate by their movements that the aliquot parts of a mètre cube exactly agree with one another.
3. If the meter works with accuracy and regularity.
4. That it be not arranged in such a manner as to facilitate any fraudulent attempt to alter the water-level, or to allow of the abstraction of gas without registration. Furthermore, the apparatus shall be subjected to such other verification as may subsequently be considered necessary.

ARTICLE 6. This verification shall take place at the meter-maker's factory, or in the gas-works of the place. Each meter-maker, and every gas-work shall consequently establish, at their own cost and within six months from this date, a special laboratory, containing a gasometer capable of holding 400 litres at least, a test-meter, pipes, stop-cocks, pressure-gauges, and other things required for the verification. These various kinds of apparatus shall be gauged and verified according to the regulations to be made by competent authorities, and they shall be afterwards stamped with the seal of the administration.

ARTICLE 7. No meter shall be allowed to be stamped,

1. If its index does not on trial correspond exactly with that of the gasometer or regulator.
2. If it require for its working, a pressure of more than 2½ millimètres of water.
3. If the various pieces of its clock mechanism be not combined in such a manner as to indicate only aliquot parts of a mètre with rigorous exactness.
4. If it be not constructed in such a manner as to prevent any change in the proper water-level, and to hinder any fraudulent alteration of it.
5. If the arrangements permit of the fraudulent abstraction of gas, in any manner whatever, without registration.
6. If the working of the meter do not afford a guarantee of the necessary regularity and correctness.

ARTICLE 8. Every meter shall have attached to it a metal plate, having the name and residence of the maker, also his mark, the number of the meter, the quantity of gas it will pass in an hour under an average pressure of 15 millimètres, the number of burners it will supply, and the year in which the meter was made. This plate shall be soldered on to the front part of the meter.

ARTICLE 9. The tester shall impress the stamp of the administration upon the principal joints of the meter, so that no meter can be altered after having been proved. He shall impress it also on the screw of the proper water level, on the clasp of the case of the clock mechanism, and upon one of the sides of the plate.

ARTICLE 10. The meters intended to be sent abroad shall be marked and numbered in the manufacturer's book; in the centre of the plate above-named there shall be impressed in large letters the word *Etranger*, and the inspector shall impress a special stamp on the side of the plate. The use of these meters shall be distinctly prohibited on French territory unless they be proved and stamped. The makers will have the privilege of submitting the meters intended for exportation to be proved and stamped.

ARTICLE 11. Every meter which shall undergo repairs shall have an additional plate fixed above that of the maker, on which shall be written the word "*Reparé*," and before it is returned to the consumer it shall be again proved and stamped as at first.

ARTICLE 12. Every consumer and every director of a gas-work may demand a fresh verification of a meter when in action; the cost of removal, of proving, and of replacing the meter to be borne by the party who requires it to be again proved; with the exception, nevertheless, that the costs shall be defrayed by the opposite party if the examination of the apparatus prove that its inaccuracy was occasioned by the latter, whether intentionally or not.

ARTICLE 13. The cost of proving shall be fixed at the rate of five centimes (one halfpenny) per burner, but in no case shall the amount of the charge be less than one franc, nor more than fifteen francs for meters of large size. The meters repaired are to be exempted from this charge. The recovery of the amount shall be proceeded with according to subsequent rules of the administration.

ARTICLE 14. Every new kind of meter before being subjected to proof and stamping shall be subjected to examination by a special commission to be named by the minister, to determine—

1. If the meter be patented or not.
2. If it be already in use in foreign countries, and from what time.
3. The place where the meter will be experimented with, and where it will be proved. A complete and detailed description of the construction and mode of working must be attached to every request for approbation, accompanied by designs and a model.

ARTICLE 15. Every inspector, tester, or agent commissioned by the administration of weights and measures to prove meters, shall be authorized to prepare a *procès verbal* when he shall have detected any fraudulent tricks on a meter, for the purpose of having the case referred to a competent tribunal.

ARTICLE 16. In case of refusal either by a consumer or by the director of a gas-work to have a meter proved, the inspector shall apply to the local authorities, and require their assistance.

ARTICLE 17. The meters already in use which, although stamped by the local authorities, are not entirely in accordance with the prescriptions of Article 7, shall continue to be used until they require repair; but from that time they must be made to agree with the provisions of this decree.

ARTICLE 18. Our Minister of Commerce, Agriculture, and Public Works is charged with the execution of the present regulations.

THE COALFIELD OF NORTHUMBERLAND AND DURHAM.

By NICHOLAS WOOD, ESQ.

(*From a Paper read before the Institution of Mechanical Engineers.*)

ITS GEOLOGICAL POSITION, DISLOCATIONS, &c.

A general outline plan of the coalfield of Northumberland and Durham is given in fig. 1. The area of the coal beds is shown by the shaded portion, and the boundary is marked by the dotted line, extending from the sea coast near Warkworth at the northern extremity, along the western margin of the coalfield, for a length of about 50 miles to the Auckland valley; and then trending along the southern boundary eastwards to Redworth, where the coal beds become covered by the overlying magnesian limestone beds, the breadth of the coalfield generally being about 20 miles, and the length along the sea coast 60 miles. All along the western margin of the coal measures they rest upon the millstone grit of the carboniferous series, and crop out to the surface throughout the entire extent above described, the beds rising greatly westwards. At or near Redworth the coal measures are met by the overlying magnesian limestone, which reposes unconformably upon them, and continues all along the southern margin of the coalfield to the sea, and for a considerable distance northwards, as shown upon the plan by the dotted line. The magnesian limestone rests upon the coal measures throughout the entire south-eastern part of the county of Durham, in a triangular shape, the base of the triangle extending eastwards about 17 miles from Redworth to Castle Eden, and the apex running into the sea at Tynemouth, at about 21 miles distance northwards. The southern boundary of the coalfield is not clearly ascertained, owing to the overlying limestone; but, as shown on the plan, the collieries of Trimdon, Castle Eden, and several others have been worked near the southern margin of the upper beds. How far the lower beds extend southwards is not yet ascertained. The upper beds at Trimdon, Wingate Grange, and Castle Eden, rise southwards to the magnesian limestone, but they dip eastwards towards the sea at Castle Eden, Shotton, Seaham, and Monkwearmouth; while from Harton to Hartley they rise towards the sea; and again at the northern limit at Warkworth they dip towards the sea. It is, therefore, not yet known to what extent the coalfield reaches towards the south-east, nor how far into the sea in the eastern portion south of the Tyne.

The lower beds of the coal measures crop out to the surface and are level with the sea at the extreme northern limit; but the line of outcrop of the measures rises gradually as they proceed west and south, until at the south-western extremity the coal measures crop out to the surface about 300 feet above the sea level. Generally the dip of the beds is at right angles to the line of outcrop of the coal, but not entirely so. The greatest depression of the beds is somewhere in the neighbourhood of Sunderland, and from this point they rise northwards, westwards, and to the south-west, so that the centre of the basin is at or near Sunderland; and from this point northwards the beds again rise towards the sea, and from Castle Eden westwards they rise to, and are cut off by, the nearly horizontal deposit of the magnesian limestone.

Fig. 2 is a section of the coal measures taken westwards from Tynemouth, in the direction marked **T W** on the plan. This section shows the point of greatest depression of the coal measures in the neighbourhood of Percy Main, from whence the beds rise eastwards to the sea; westwards from Percy Main the beds rise towards the west, and the High-Main coal crops out a little to the north and west of Newcastle. The lower beds then become the seams

worked, which rise gradually towards the west, meeting with the great 90-fathom dyke between Blaydon and Ryton Woodside, by which they are thrown down, a gradual rise taking place westwards until they crop out to the surface at Hedley Fell.

The sandstone of the millstone grit then appears; but it is a fact of some importance, in a geological point of view, that the coal beds do not terminate here. The surface of the ground rises westwards along the line of the 90-fathom dyke, which runs from this place nearly westwards until it reaches the great Penine fault at the base of the Tindale Fell hills in Cumberland, and abuts against the red sandstone of the Carlisle plain, as shown in the section fig. 3, which is an extension of the section, fig. 2, drawn to a smaller scale. In several places along the line of this dyke, and immediately on the north side of it, there are small detached coalfields, from one to two miles in length, parallel to the dyke, and about half a mile in width, as at Stublick, Coanwood, and Hartley Burn. There are three or four beds of coal, and they are generally of the same quality as the lower beds at Hedley Fell. It is a curious fact, as regards the deposit of coal and its subsequent denudation, that these small tracts of coal should exist at so great a distance from the great field of coal, the most westerly at a distance of nearly thirty miles; and it is a still more curious fact that on the south side of the 90-fathom dyke there are no workable beds of coal in the limestone beds of Alston Moor, Tindale Fell, &c.; whereas on the north side in those beds, and immediately adjoining the dyke, there is an excellent bed of coal nearly four feet thick, called the Talkin seam, which is worked on the north side of Tindale Fell, and also at Blenkinsop, where it is upwards of five feet in thickness.

In fig. 4 is given a section of the carboniferous strata taken northwards nearly parallel to the sea coast from Tynemouth to Berwick-on-Tweed, in the direction marked **T N** on the plan fig. 1, showing the regular coal measures resting on the millstone grit, then the great beds of the mountain limestone, and lastly the beds of old red sandstone, forming the great deposit of old red sandstone of the vale of the Tweed, which with intervals of grauwacke beds continues up the Tweed to Jedburgh and Hawick, and from thence westwards in occasional patches until it joins the red sandstone of the Carlisle plain at Cannoby. CC are the coal measures and their accompanying beds of sandstone and shale; P is the millstone grit formation; R the mountain limestone formation, with its associated beds of shale and sandstone; S the old red sandstone of the Tweed, forming the lower portion of the carboniferous series with the coarse conglomeratic red sandstone at the bottom, sometimes reposing against, and sometimes resting upon, the grauwacke and schist hills, U, of the south of Scotland; V in fig. 3 is the red sandstone of the Carlisle plain. At the extreme northern and eastern limit of the coal measures at Warkworth, the millstone grit and limestone beds of the mountain limestone series rise out successively along the line of the coast, until they meet the almost vertical beds of the grauwacke slate formation, at or a little to the north of Berwick, against which they repose; the old red sandstone beds at the bottom of the corboniferous series resting against the vertical grauwacke beds, in all the sinuosities of these rocks almost along the entire base of this formation from Berwick into Cumberland.

In some parts of the district masses of basalt exist to a considerable extent; and in the middle almost of the limestone beds a stratum of basalt is interposed called the "Whin Sill," shown at X in the sections figs. 3 and 4. The overlying masses of basalt, Z, at Dunstanburgh and elsewhere seem to have been the outpouring of the basalt from dykes of that rock in the neighbourhood of those patches.

The great Penine fault, shown at Y in the section fig. 3, which runs almost at right angles to the line of the base of the grauwacke hills, runs southwards along the western face of the escarpment of the carboniferous hills of Cumberland and Westmoreland, and forms a line of separation between the evidently upheaved beds of those hills and the horizontal beds and plain of red sandstone of Carlisle, &c. All along the base of the grauwacke hills in the north of Northumberland and south of Scotland, the old red sandstone and lower beds of the mountain limestone are not much elevated above the level of the sea; the great elevation of these beds is more towards the south-west along the eastern side of the great Penine fault; and the position of the beds of this formation, as shown in fig. 4, would rather indicate that they have not been much disturbed, if at all, by the protrusion of the grauwacke hills, and that the latter hills were a previous elevation, and the deposit of the carboniferous rocks a subsequent deposit. The great Penine fault appears, on the contrary, to have been formed probably by subterranean force acting from below, elevating the mountain limestone and coal formation along the south-western extremity of this formation, on the east side of the Penine fault, as shown in fig. 3; and it is a somewhat curious question whether the same causes have not elevated the more recent beds of the magnesian limestone likewise; for though these beds do not repose conformably upon the coal measures, they rise considerably from the sea in a south-western direction.

Fig. 5 is a section of the coal beds and superincumbent magnesian limestone taken southwards from Tynemouth to the southern extremity of the coalfield at Castle Eden, in the direction marked **T S** on the plan, showing that the magnesian limestone beds, M, repose unconformably on the coal measures throughout their extent from Tynemouth southwards, and showing also the basin shape of the coal measures. This section is nearly parallel to the sea coast, being taken in almost a direct line from Tynemouth to the Castle Eden colliery. Interposed between the magnesian limestone and the upper beds of the coal measures is a bed of marly sand, O, sometimes nearly 100 feet in thickness, containing occasionally vast feeders of water and presenting formidable obstacles to the sinking of pits through that stratum.

The principal dykes in the coalfield are shown upon the general plan; the slip-dykes or faults, where the strata are simply thrown up or down, are indicated by full black lines, the amount of elevation or depression being given in each case; and the whin dykes, formed by the injection of a wall of volcanic matter, are indicated by dotted black lines.

A remarkable slip-dyke is show on the plan crossing the coal measures in a somewhat south-western direction, and called the "90-fathom dyke," along the line of which the strata are thrown down 90 fathoms or 540 feet on the north side. The down-throw of this dyke is not, however, always to the same extent; for in some places the strata are depressed nearly 1200 feet. It is very clearly defined to be a slip-dyke of depression at Killingworth: for taking a line northwards from Long Benton to Killingworth, about 1½ miles distance, the coal beds to the south of Long Benton and to the north of Killingworth rise very regularly and gradually towards the north, lying about 360 feet below the surface; while between these two places where they cross the dyke they are depressed on the north side about 1200 feet. Also the rise of the beds from Long Benton continues regularly northwards to the dyke, until they are about 270 feet from the surface; while on the north side of the dyke the coal has been worked about 1380 feet deep, rising rapidly from the dyke until it again assumes its regular northerly rise at 300 or 360 feet from the surface near Killingworth. It is also worthy of notice that this dyke runs through the millstone grit and limestone beds across the entire series, and terminates at the Penine fault at the base of Tindale Fell in Cumberland, throwing down the regular coal measures on the north side of the dyke and producing small detached basins on that side as far west as Hartley Burn in Cumberland. At this place, as well as at others along its course where the coal has been worked, it is known that the coal beds dip rapidly towards the dyke on its northern side, showing it to be a dyke of depression.

Another remarkable dyke in this coalfield is a basaltic dyke, called the "Hett Whin Dyke," shown on the plan, fig. 1, running across the entire extent of the coal measures from Easington on the sea coast to near Witton-le-Wear on the west. This is a true basaltic dyke, which extends into the mountain limestone measures on the west, and likewise cuts through the more recent unconformable magnesian limestone beds near the coast, as shown in the section fig. 5, so that it must have been formed subsequent to the deposit of the latter beds.

There is another very curious circumstance connected with this coalfield. It will be observed on the plan, fig. 1, that between Durham and Newcastle-on-Tyne, or rather between the river Wear near Durham and the river Tyne near Newcastle, two nearly parallel dotted lines are laid down; these represent an alluvial deposit to the depth of 160 feet. This is, in fact, what appears to have been an ancient river between those places, the depth of which has apparently been about 160 feet below the present high-water level of the sea. All along the course of this river the deposit exhibits all the appearances of a wash or strong current: all the sand, gravel, and boulders of a river are found, the latter of considerable size, and worn almost perfectly round; and the depth increases from Durham to the Tyne. This is certainly a curious circumstance, and would almost imply that the elevation of the mountain limestone and coal beds to the west by the same causes which produced the Penine fault had been accompanied with a depression of these beds on the east, and that the coal measures along the line of this now subterranean river-bed had been depressed after their deposition and consolidation, and so lowered the bed of the river below the present sea level. The rapidity of the water of this ancient river is shown by the soft strata of its sides being greatly abraded all along its course.

There are several beds of coal in the Northumberland and Durham district, the details of which are given in various published works. The following are the most important, and are those at present worked in some or other of the localities:—

1. High-Main seam (Tyne)	6	feet thick.
2. Five-Quarter (Wear)	3½	"
3. Main (Wear)	5	"
4. Maudlin (Wear), or Bensham (Tyne)	5½	"
5. Low-Main (Wear), or Yard (Tyne)	3½	"
6. Hutton (Wear), or Low-Main (Tyne)	4½	"
7. Harvey (Wear), or Beaumont (Tyne)	4½	"
8. Busty Bank (Tyne)	5	"
Total thickness	37½	feet.

As this paper is intended to give only a very general description of the coalfield, the details or precise thickness of each seam are not attempted to be given. In different localities all the seams vary in thickness, neither are they all workable in the same locality. They are likewise in some localities divided by bands of stone which increase in thickness, and thus other seams are formed having specific names, and in some instances the same bed of coal has different names in different localities. Thus the Hutton seam on the Wear is called the Low-Main on the Tyne and in the steam-coal district; and, again, the Low-Main of the Wear is called the Yard coal of the Tyne. It would be a great convenience if a general nomenclature could be established throughout the entire district; for it requires a reference to the works especially devoted to those details in order to identify what seam is meant by a particular name.

In the appended Table I. is given an entire section of the coal measures at the Seaham and Seaton pits, where they are at nearly their greatest depth from the surface or near the bottom of the basin, giving the strata as far down as to the Harvey seam. The Harvey seam, however, is not the lowest in the series; a sinking has recently been made by the writer at Black Boy colliery to a seam of clean coal which is 360 feet below the Harvey seam and about 5 feet thick, identical with the Woodhouse Close and St. Helen's seam in the Auckland district, and supposed to be the lowest workable seam in the district.

In Table I. the Low-Main seam is not in its proper position, in consequence of a slip-dyke crossing the shaft. Table II. gives a section of the sinking of the adjoining colliery at Murton, from the Main to the Hutton seam, showing the regular stratification free from dykes.

COMMERCIAL CHARACTER OF THE COAL BEDS.

The general character of the coal found in the Newcastle coalfield is that of a bituminous coal, yielding large quantities of gas, making excellent coke; but in some parts of the coalfield it is open burning, slightly, if at all, coking, and thus forming steam-engine coal. Without going into the chemical nature of the different sorts of coal, which has been fully described in other works, and which it is foreign to the purpose of this paper to give in detail, it may be stated that in a commercial point of view there are four distinctive varieties of coal—namely, household fire coal, gas coal, coking and manufacturing coal, and steam-engine coal.

A list has already been given of the different beds of coal occurring in the Newcastle district. As regards their commercial character, the first four beds—namely, the High-Main, the Five-Quarter, the Main, and the Bensham seams are essentially household-fire coal, in some localities excellent in quality, in others deteriorating to inferior quality; they never become first-rate, although occasionally nearly so. These beds, though varying in quality, substantially retain their character of household coal; they are too carbonaceous for a good gas coal, too bituminous for a good steam coal, and do not possess the pure quality or other characteristics of a fine household or of a good coking coal.

The next bed in succession—namely, the Low-Main of the Wear, or the Yard coal of the Tyne—probably retains its character throughout the entire district most uniformly of all the beds. In the extreme southern portion on the Wear it is a hard bituminous, open-burning, or carbonaceous coal, adapted in some respects as a household coal, and likewise as a steam or manufacturing coal, and used for these purposes; not first-rate in any of its qualities, but preferred as household coal to some others from being very hard and not liable to break into small coal; and hence it is extensively used for foreign export as household coal, though it produces a considerable quantity of white ashes. Its carbonaceous property and its open burning adapt it for steam-engine purposes, although somewhat too bituminous: it is less bituminous in the north of the coalfield, and in that locality forms a better steam coal.

The next bed is the Hutton seam, which is perhaps the most important, and certainly, commercially considered, the most peculiar of any of the beds. In the southern part of the coalfield, on the south of the Wear, it forms the most superior household coal—namely, the Hetton, Haswell, and Stewart's Wallsend coal—and is perhaps the most perfect and best household coal in

existence, leaving no residue whatever when in perfection. Proceeding north and west from the Wear, it becomes more friable or more tender, though still bituminous; and at Pelaw Main, Pelton, Springwell, Heworth, and Felling, it forms the best coal for gas purposes in the coalfield. It does not yield such a large quantity of gas as the cannel coal of Lancashire, but in some other respects it is superior; and at the present time upwards of 2,000,000 tons of it are annually exported for gas purposes. Towards the north of the coalfield, the quality of this bed deteriorates; it becomes less bituminous, more carbonaceous, and less pure; but in the extreme north division of the Tyne, and in the Cramlington and Hartley district, it becomes the best steam-engine coal in the district, burning quite freely and open, leaving no clinkers and scarcely any ashes, and not being at all of a coking or bituminous character in the fire. It will be seen, therefore, that the Hutton seam of the Wear or the Low-Main of the Tyne, the same bed of coal, assumes in the different districts the several characters of the best household coal, the best gas coal, and the best steam-engine coal of the coalfield.

The next two beds—namely, the Harvey and the Busty Bank seams—possess the property of coking, and are those now so extensively made use of for locomotive engines. The upper bed partakes of the qualities both of a gas coal and of a coking coal, and is used for both purposes; but it is not of first-rate quality. But the lower bed is of excellent quality as a coking coal, burning quite clean on the firebars of the locomotive engines, and leaving no scoria whatever.

There are also two or three other beds of coal in the western part of the coalfield, of the same quality of coking coal, which seem to result from a division of the beds previously enumerated, or to be thin portions of the upper beds, which become workable near the outcrop of the lower beds.

EXTENSION OF THE COAL TRADE OF NORTHUMBERLAND AND DURHAM.

The rapid extension of the coal trade of these counties within the last fifty years is most remarkable. At the commencement of that period the total quantity of coals exported was about 2,500,000 of tons; these were exported from the rivers Tyne and Wear, and a small portion from Hartley and Blyth. The great coalfield of Auckland was not then opened out, except a few landsale pits: no collieries had been opened out south of the turnpike-road from Durham to Sunderland; there was no Seaham Harbour, no Hartlepool or West Hartlepool, no Middlesboro' Harbour, and no export of coals from Stockton-on-Tees; all the Hetton, Haswell, South Hetton, and Hartlepool collieries were unopened. Since 1818, or within forty years, the ports of Stockton-on-Tees by the Stockton and Darlington Railway, and Middlesboro' by an extension of that line, have become extensive shipping ports; East and West Hartlepool by the Clarence or Stockton and Hartlepool Railway, Seaham by the Seaham line of railway, and Amble by the Radcliffe line of railway.

The following is a return of the quantities of coal in tons exported from the several ports in the counties of Northumberland and Durham in the years 1799 and 1856, showing the quantity exported to London and other ports in the United Kingdom, and also to foreign countries:—

Coals exported by Sea from Northumberland and Durham in 1799 *and* 1856.

	Year.	To London, &c.		To Foreign Countries.		Total Quantities Exported.	
		Coals. Tons.	Coke. Tons.	Coals. Tons.	Coke. Tons.	1799. Tons.	1856. Tons.
Newcastle	1799	1,186,720	..	114,920	..	1,301,640	..
	1856	1,978,682	6,898	1,714,668	98,048	..	3,798,296
Blyth	1799	110,478	..	337	..	110,815	..
	1856	96,479	..	79,757	..	..	176,236
Amble	1856	21,228	..	37,801	..	..	59,029
Sunderland	1799	791,213	..	10,703	..	801,916	..
	1856	1,337,538	304	700,654	27,747	..	2,066,243
Seaham	1856	652,625	..	70,675	101	..	723,401
Hartlepool	1856	1,074,189	1,625	488,595	21,473	..	1,595,882
Stockton	1856	11,104	33	4,042	503	..	15,682
Middlesboro'	1856	142,438	663	76,531	26,676	..	246,308
Total quantity exported						2,214,371	8,681,077

The total quantities exported at the respective periods are therefore—in 1799, 2,214,371 tons of coals; and in 1856, 8,681,077 tons of coals and coke.

Besides the above quantities of coals exported, there are large quantities conveyed along the district railways and the several railways extending from them, which did not exist in 1800 nor for nearly twenty years afterwards. The quantities of coal conveyed by railway in 1856 and 1857, as given in Mr. Hunt's report, are as follows:—

Coals conveyed by Railway from Northumberland and Durham in 1856 *and* 1857.

	1856. Tons.	1857. Tons.
North-Eastern Railway (omitting coke in 1856)	1,753,046	2,554,330
Newcastle and Carlisle Railway	197,394	184,502
Great Northern Railway	244,308	164,665
Total quantity conveyed	2,194,748	2,903,497

The following is given in the report above mentioned as the gross produce of the Northumberland and Durham collieries, about 410 in number, in 1856 and 1857:—

Gross Produce of Northumberland and Durham Collieries in 1856 *and* 1857.

	1856. Tons.	1857. Tons.
Coals exported to foreign countries	3,165,112	3,632,211
Coke ditto equal in coals at double weight to	418,796	443,974
Coals sent coastways	5,440,431	5,663,189
Coke ditto equal in coals at double weight to	19,096	22,842
Coals and coke sent inland by railway	2,257,000	2,143,134
Coals sent to London by railway	164,534	109,175
Coals and coke used in iron-works	2,298,000	2,432,000
Colliery consumption	130,000	130,000
Local consumption for manufacturing, &c.	1,600,000	1,250,000
Total produce of collieries	15,492,969	15,826,525

There are no means of ascertaining the entire produce in 1800: but, with regard to the first six items in the above statement, the total quantity in 1799, as previously given, is 2,214,371 tons; and, as regards the seventh item, it has been already stated that there were only two blast furnaces erected in 1800, so that the whole of this item may be omitted, leaving only the colliery and local consumption, which at that period would not be more than about 500,000 tons. This gives an entire produce of about

2,750,000 tons in 1800,
15,500,000 tons in 1856,
15,750,000 „ 1857.

The total produce of the United Kingdom has been estimated at 64,000,000 tons in 1856, and nearly 65,500,000 tons in 1857; so that it appears the produce of the Newcastle-on-Tyne district is about one-fourth of the entire produce of the kingdom.

TABLE I.

Section of Strata at the Seaham and Seaton Pits.

		Ft.	In.	Ft.	In.
Outset		3	0		
Soil		1	0		
Brown clay, strong and stony		53	0		
				57	0
Soft marl					
Brown limestone, strong and marly partings	Magnesian Limestone	6	0		
		48	0		
Brown limestone, strong		120	0		
Limestone, strong with water		84	0		
Limestone, mixed with sand		4	0		
Strong brown limestone		82	6		
Sand, with water		10	0		
				354	6
Grey metal, mixed with blue		8	4		
Red metal, or sandy post		7	6		
Strong white post, mixed with whin		2	5		
Grey metal, with post girdles		3	2		
Dark metal, with post girdles		4	1		
Grey metal		34	5		
				59	11
Coal			3		3
Dark grey metal, with thin post girdles		16	11	16	11
Coal			5		
Band			2		
Coal			8		
Band			1		
Coal		1	4		
Band			2		
Coal		1	8		
				4	6
Grey metal		2	4		
Grey post, with whin girdles and metal partings		5	11		
Coal			1		
Dark grey metal		4	4		
				12	8
Coal		1	0	1	0
Grey metal		9	4	9	4
Coal			3		
Dark grey metal		1	1		
Coal			2		
				1	6
Dark grey metal		6	4		
Strong white post		12	4		
Dark grey metal		14	3		
Black stone, with ironstone girdles		6	0		
				38	11
Coal		2	8		
Band			4		
Coal		1	11		
				4	11
Grey metal		11	3	11	3
Coal			1		1
Grey metal		7	6		
Grey post		7	6		
Grey metal		73	3		
				88	3
Coal			8		
Black stone, mixed with coal			3		
					11
Strong grey post, with post girdles		13	7	13	7
Foul coal			7		7
Grey metal, with post girdles		15	1		
Strong white post		25	9		
Grey metal		33	10		
Strong white post, with water		43	9		
Dark grey metal		34	3		
				152	8
Coal			3		
Band			7		
Coal			3		
				1	1
Strong grey post, with metal partings		8	3	8	3
Coal			8		8
Grey metal, with black partings and ironstone balls		16	6		
Strong grey post, mixed with whin		33	3		
Grey metal		4	3		
				54	0
Coal		2	10	2	10
Strong white post, with water and metal partings		36	0		
Grey metal		1	0		
Strong white post, with water		18	9		
				55	9
Coal		2	3	2	3
Carried forward				953	7

Brought forward			953 7
Dark grey metal	6 7		
Black metal, mixed with coal	14 0		
Strong white post, with metal partings and water	31 4		
Dark grey metal	13 1		
		65 0	
Coal	8		8
Grey metal	13 2	13 2	
Coal	6		6
Grey metal, with post girdles and water	26 3	26 3	
Coal	8		8
Grey metal, with post girdles	99 0	99 0	
Coal . . . . . FIVE-QUARTER SEAM	3 5		3 5
Strong grey metal stone, with post girdles	34 0		
Black metal, mixed with coal	2 0		
Grey metal	4 5		
		40 5	
Coal	1 0		1 0
Grey metal, with thin girdles	23 0	23 0	
Coal	1 2		1 2
Strong grey metal stone	27 5		
White post	16 5		
Black post, seamy	1 2		
Strong grey post, with metal partings	54 4		
		99 4	
Coal . . . . . MAIN COAL SEAM	6 1		6 1
Strong grey and white post	15 1		
Black stone	2 6		
Grey metal, with ironstone girdles	28 11		
		46 6	
Coal . . . . . LOW-MAIN SEAM	3 6		3 6
Grey metal, with post girdles	79 3		
Black metal	3 0		
		82 3	
Coal	11		11
Strong grey metal, with post girdles	7 10	7 10	
Coal	5		5
Grey metal and post girdles	9 5	9 5	
Slaty coal	1 2		1 2
Strong post, mixed with grey metal and post girdles	34 7	34 7	
Coal . . . . . HUTTON SEAM	4 10		4 10
Bottom coal and shale	6 9		
Strong grey post, with metal partings	28 10		
Black metal	1 2		
Grey metal stone, with post girdles	7 7		
Black stone	1 0		
		45 4	
Carried forward			1570 0

Brought forward			1570 0
Coal	1		1
Strong white post	31 7		
Black metal, mixed with coal	11 2		
Dark grey metal, mixed with coal	7 4		
Strong white post	1 8		
Black metal	3 0		
Strong white post	48 7		
Grey metal, with thin post girdles	13 6		
		116 10	
Coal . . . . . HARVEY SEAM	2 10		2 10
Grey metal	6 0		
White post	4		
		6 4	
Total depth			1696 1

TABLE II.

Section of Strata at Murton Colliery, from the Main to the Hutton Seam.

	Ft. In.	Ft. In.
Coal . . . . . MAIN COAL SEAM	6 2	6 2
Strong white thill	2 0	
White shivery post	4 7	
Black stone	1 2	
Grey metal	8 2	
Strong white post	4 0	
Grey metal, mixed with ironstone girdles	4 8	
		24 7
Coal	3	3
Dark thill	3 0	
Grey metal, with ironstone girdles	22 3	
		25 3
Coal	1 1	1 1
Dark thill	2 0	
Grey metal, with ironstone girdles	6 4	
		8 4
Coal	2	2
Dark thill	4 0	
Grey metal, with ironstone balls	12 5	
Grey metal, with post girdles	21 3	
White post, with metal partings	10 0	
Strong white post	24 7	
Strong grey metal	5 11	
		78 2
Coal . . . . . LOW-MAIN SEAM	4 7	4 7
Dark swad	10	
Black stone	11	
Dark grey metal, with post girdles	9 6	
White post, with partings	21 5	
Dark post, leafy	5 4	
Black stone	7 4	
		45 4
Coal	1 8	1 8
Black stone	6 0	6 0
Coal	6	6
Carried forward		202 1

Price Current.

CASTINGS, PER TON.

Average Weight of Cast-Iron Gas-Pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle.	Wales.	Yorkshire, Derbyshire, and Staffordsh.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1	3 10 0	2 7 6	2 15 0	3 0 0	3 5 0
1¼ and 2 inches Socket-Pipes	7 0 0	6 0 0	6 5 0	6 10 0	6 15 0
2½ and 3 ,, ,,	6 10 0	5 10 0	5 15 0	6 0 0	6 5 0
4 and 5 ,, ,,	6 0 0	5 0 0	5 5 0	5 10 0	5 15 0
6 in. and upwards ,,	5 15 0	4 15 0	5 0 0	5 5 0	5 10 0
Retorts, 1st fusion, hot blast	5 10 0	4 10 0	4 15 0	5 0 0	5 5 0
,, 2nd ,, cold ,,	6 10 0	5 5 0	5 10 0	6 0 0	6 5 0
Tank Plates, ⅜ thick and above	6 0 0	5 0 0	5 5 0	5 10 0	5 10 0

WROUGHT-IRON TUBING,

Subject to 40 per cent. Discount.

	2 in.	1½ in.	1¼ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 12 ft., perft.	1 8	1 0	0 10	0 7	0 5	0 4½
,, ,, ,, 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting-Pieces, or Long Screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, Springs, and Elbows—wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron Cocks	17 6	9 6	7 6	4 6	3 3	2 6
,, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and Plain Sockets [Nipples	1 3	0 9	0 8	0 6	0 5	0 4
	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2 quart	15 0	14 0	13 6	13 0	12 0	—

COALS, PER TON.

Newcastle.—Unscreened.	6s. 3d.
Whitwell Primrose	
Medomsley, Eighton Moor, and Burnhope	6 6
Pelaw	6 9
New Pelton, Pearth, South Pelaw, Washington Hutton, and South Pearth	7 0
Pelton	7 9
Ramsay's Newcastle Cannel	16 0

Scotch Cannel.	
Boghead, at Leith	40s. 0d.
Kirkness, best	23 0
Capeldrae, 1st quality	20 0
,, 2nd ,,	12 6
Lesmahago, at Glasgow	25 0
,, ,, Leith	27 6
Arniston	22 0
Wemyss	20 0
Knightswood	18 0
Pirnie	15 0

SUNDRIES.

Best Newcastle Fire-bricks	per 1000	50s. 0d.
Cliff's Fire-bricks, at Wortley	per 1000	57 6
Ingham's Fire-bricks, at Wortley	,,	55 0
Fire-clay Retorts	per foot run, 5s. 6d. to	7 0
Tough Cake Copper ... per ton £102 10s.	Foreign Spelter ... per ton	£19 5 0
English Pig Lead ,, 23 0	English Block Tin ,,	125 0 0
Welch Bar Iron, in London ,, 7 0	Banca ,,	134 0 0
Tarred Rope Yarn	per cwt.	26s. 0d.

FREIGHTS.

Coastwise—Newcastle.—Per Ton.	
Chatham & Rochester	6s. 0d.
Cork	—
Dover	6 6
Dublin	9 6
Exeter Quay	8 0
Folkestone	6 6
Hastings	—
London (Pool)	6 0
Lowestoft & Yarmouth 4s. to	5 0
Lynn	—
Portsmouth	8 0
Plymouth	9 0
Whitstable	7 0
Weymouth	—

Foreign.—Per Keel.	
Boulogne and Calais	£7 10
Barcelona	28 0
Bordeaux	17 10
Cadiz	20 0
Copenhagen	10 0
Dieppe	10 0
Genoa	29 0
Hamburg	8 5
Havre	10 10
Leghorn	29 0
Lisbon	—
Rotterdam	8 0
Stettin	11 0
Trieste & Venice	—

Brought forward			202 1
Black stone		11 4	11 4
Coal		10	10
Grey metal		4 0	
Strong post, mixed with whin		19 0	
Grey metal, mixed with post girdles		11 9	
Black stone		7	
			35 4
Coal	Hutton Seam	5 0	
Band		1 0	
Bottom coal		1 2	
			7 2
Total			256 9

Huddersfield.—At the last monthly meeting of the Huddersfield Improvement Commissioners a report from the gas committee, recommending the purchase of the gas-works, was taken into consideration. The discussion which followed lasted nearly two hours, and the decision ultimately arrived at was—"That the proceedings of the committee of the general board on the gas question as now read be confirmed, and that in pursuance of the recommendation of such committee, the gas committee be empowered to negotiate for the purchase of the Huddersfield Gas-Works; and that Messrs. John Freeman and John Crawshaw be authorized to sign, on behalf of the commissioners, a provisional agreement conditionally upon proper authority being obtained by the statute authorizing such purchase." The purchase money is understood to be £63,000.

Salford.—On Saturday afternoon last the officers and workmen of the Salford Gas-Works presented to Mr. Horatio Brothers, the engineer and manager, a valuable gold watch and chain, as a testimony of their esteem for his urbanity and kindness during his connexion with the above establishment. Mr. Brothers has been appointed engineer of the Equitable Gaslight Company, London.

Gas for Shiplights.—Experiments upon an extensive scale have just been made on board the steamships and in the dockyard at Woolwich, with the newly patented lights of the Hon. Major W. E. Fitzmaurice, before the commodore and officers appointed to witness them. The lights were shown in two forms, either of which can be made on board—one an ordinary form of exceedingly brilliant gas, the other a "grand" or compound one for extensive operations. The experiments were commenced in the engine-room of the *Prometheus* steamship, which was unusually well illuminated by one fishtail burner, and the four oil lamps ordinarily used were obscured by it. The same success resulted when compared on board the *Fisguard* with the ordinary police lamps, as so called, and commonly used 'tween decks, and the greater safety and sanitary value of this gas over oil lamps was made particularly apparent. One of Major Fitzmaurice's grand portable life-lights was carried to each end of the long avenues of the dockyard, at which distance minute operations or even reading could be performed; and telegraphing could be conducted by its use at many miles distant. The interior of the church in the dockyard was afterwards brilliantly lighted by one light, which was carried in and held by the hand.—*Express.*

Advertisements.

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ON SALE, Two Station-Meters, in Round Cast-Iron Cases, made by Parkinson and Co. in 1847, to pass 10,000 cubic feet of Gas per Hour, and now at work at the Gas-Works, Leicester. Price £10 each net.

Further particulars may be obtained on applying to H. M. Robinson, Esq., Gas Office, Leicester; or to West and Gregson, Oldham.

WROUGHT-IRON Guides for Gas-holders.—Designs and Working Drawings for Trussed Wrought-Iron Guides and Frames can be obtained of Charles Dixon, C. E., Chichester, Sussex.

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MR. LAMING (Inventor of the Revivified Oxide of Iron Purification) has the satisfaction to announce that Gas may now be purified in a manner that combines unusual commercial advantages with all the possible requirements of the sanitary officer and the public. All that need be said to call attention to the new process is, that instead of the purifying-house, two vessels of small area, placed after the condenser, suffice; that these vessels never have the least communication with the atmosphere; and that neither lime, oxide, nor any other substance foreign to the gas itself is brought into contact with it. Gas engineers will perceive among the advantages thus offered, economy in room, labour, and materials; impossibility of nuisance; and total absence of injury to the illuminating power.

Particulars by addressing Richard Laming, 118, Fenchurch Street.

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June 11, 1859.

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WATER and DRY GAS-METERS, with all the latest improvements.
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STATION-METERS of first-class quality.
PHOTOMETERS, PRESSURE-GAUGES, TEST-METERS, GASHOLDERS, &c.
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STREET-LAMP LAVA BURNERS, cased in Brass, 24s. per gross—to burn 2½, 3½, 4, and 5 feet per hour.
Argand, Sun-Ring, Photometer, and all kinds of Burners in Lava.

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COTTAGE LANE, CITY ROAD LONDON,
Beg to announce that, in addition to the Manufacture of
GAS-METERS,
they continue the Manufacture of
METERS FOR MEASURING WATER, SPIRITS, &c.,
commenced, under Patent in 1849, by the late Mr. William Parkinson.

These Meters are as simple and durable as the Gas-Meter, and as correct as that instrument in the registration of the fluids passing through them.

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Beg to draw the attention of Engineers and Managers of Gas Works to the superior quality of the Article they manufacture, both in respect of the iron employed, and the perfect manner in which it is welded; in proof of which they can refer to the testimonials of the most eminent Gas Engineers, and the experience of the principal of the large Gas Companies of the kingdom.

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KAY'S Patent Equitable Gas-Meter is the most effective preventive of fraud by "tilting," and is as simple in construction as the common meter.

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N.B.—A few Retorts of each size, and a large stock of Bricks and Lumps, always on hand at the above Wharf.

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one of which answers the purpose of THREE ordinary Valves, as applied to Purifiers, or in shutting off and passing Station-Meters, Governors, or other apparatus, while the Connecting-Pipes are also much simplified.

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designed to be heated by Tar alone, and with a total absence of Smoke.

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Can at all times be seen tested at the Manufacturer's,

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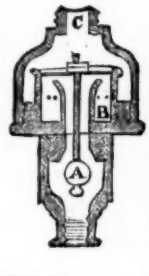

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COMPENSATING GAS-METER

Affords *absolute security* both to Gas Companies and Consumers, by maintaining a *constantly accurate Water-Level under all circumstances*, by means so simple and effective as to baffle and remove those objections which have been successfully urged against other complicated contrivances professing the same object.

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By Her Majesty's Royal Letters Patent.

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PATENT DRY and IMPROVED WET GAS-METER WORKS,

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ESTABLISHED 1836.

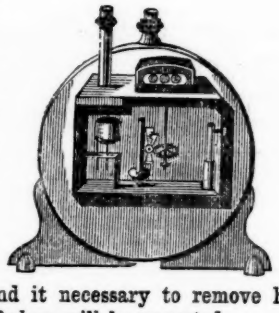
J. MEACOCK begs to call attention to his patent method of securing the Leather diaphragm of his Dry Meter. Instead of using the soldering iron for this purpose, it is held between two flat Metal Rings, and screwed up sound to a metal frame, as shown in the drawing.

By this improvement the perishing effect of hot tools to leather being avoided, its durability must be longer; also, its repair when needful is most simple, as a new leather diaphragm can be applied by merely unscrewing the old one from the rim or frame to which it had been screwed up.

Meters of Gas Companies being subject to so much wear and tear, J. M. begs leave to assure those who may honour him with their commands, that nothing but the stoutest materials for cases, the hardest gas-resisting metals, and best foreign leather for the interiors, will be used, and none but first-class workmen employed in their construction.

Wet Gas-Meters Repaired and Reconstructed with J. Meacock's Modern Improvements.

METERS SENT ON APPROVAL.



In consequence of the great demand for the above Meters, J. Meacock has found it necessary to remove his Manufactory to more extensive Premises, 16, West Street, Smithfield, where Orders will be executed on the shortest notice.

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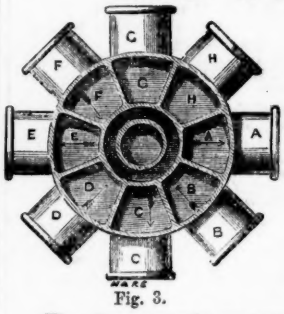

Fig. 3.

THESE Valves are formed of two cast-iron cylinders, with segmental divisions, having faces ground gas-tight, the upper cylinder turning horizontally on the lower one.

The lower cylinder has pipes from each division communicating with the vessels to and from which gas is to be passed. The upper cylinder has corresponding divisions, so arranged as to direct the passage of gas to the different segmental divisions in the lower part, and when it is turned on the face of the lower one to alter the flow of gas from one vessel to another.

Fig. 4.

Fig. 3 represents an arrangement for four purifiers, in which, by turning the upper cylinder, Fig. 4, the Gas is directed through three purifiers, and either one in rotation left out for cleaning.

A slight variation of this arrangement adapts the Valve to three purifiers, passing the Gas through two of them, and having each one in rotation out of use.

Another arrangement is just completed for two purifiers, by which the Gas may be directed through both purifiers together, entering either first, or through either purifier separately. The advantages of this arrangement will be too manifest to Gas Manufacturers to need comment.

The Valves are manufactured by the Patentees at their

IRON WORKS, FROME SELWOOD.

The following Testimonial has been received from an eminent Engineer:—

Gaslight and Coke Company's Office, Cheltenham, Jan. 17, 1859.

Messrs. Cockey and Sons, Frome.

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I am, Gentlemen, yours truly, W. ESSON.

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PURIFIERS, SCRUBBERS, CONDENSERS, AND OTHER IMPROVED GAS APPARATUS,

HAVING PATTERNS SUITABLE FOR GAS-WORKS OF DIFFERENT SIZES.

FIRE-CLAY GAS RETORTS.

ESTABLISHED IN 1795.

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THESE RETORTS are unrivalled in excellence, being the BEST FINISHED INTERNALLY, and THE MOST CORRECT IN FORM, of any in the Kingdom. From the peculiar composition used in working up the face of the material, they are rendered unusually smooth, close, and FREE FROM SURFACE CRACKS, thus, in a great measure, preventing leakage and the adhesion of carbon to their interior surface.

To meet the yearly increasing demand of UPWARDS OF THIRTY SEASONS and to carry out the late improvements in the manufacture, the Premises have been re-erected and much enlarged, and Engineers may rely WITH CONFIDENCE on their orders being completed with a greater regard to despatch than by any other House.

THE WORKS ARE WELL SITUATED

For EXPORT from the Ports of { LONDON, LIVERPOOL, HULL, MIDDLESBRO', HARTLEPOOL, and STOCKTON.

FIRE-BRICKS, LUMPS, GUARDS, TILES, AND CLAY OF THE SAME QUALITY.

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PADDON and FORD respectfully invite the attention of Gas Companies and Managers to their PATENT STREET LAMP REGULATOR, which ensures any required consumption.

By its use a great saving is effected, and the item of "Unaccounted-for Gas" considerably decreased.

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Manufacturers of WET and DRY GAS METERS, STATION METERS, GOVERNORS, EXPERIMENTAL APPARATUS, LANTERNS, &c. &c.

Contractors for the erection or alteration of Gas-Works; and every description of Apparatus required in Gas-Works supplied.

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Contracts for Tanks, Gasholders, Roofs, Purifiers, and all descriptions of Gas Apparatus executed on the most reasonable terms. Improved Slide Valves, Steam, and Range Boilers, and Smiths' Work, of the best materials and workmanship.

"ALL DOUBTS REMOVED."

DEFRIES' celebrated Dry Gas-METERS, of which there are 80,000 in use in Palaces, Churches, Chapels, Royal Dock-yards, Club Houses, Public Offices, and other buildings throughout the Empire, the Continent, and Colonies.

His meter for 1500 lights, in use upwards of ten years at the Royal Italian Opera, until that building was destroyed by fire, was long afterwards dug out of the burnt ruins, then tested by the Chartered Gas Company and found inflexibly correct.

On the 9th of June, 1858, at the Western Gas Company, his meter for 150 lights, after considerable use, was doubted, and subjected to the most variable tests, from the full lighting down to a single jet, and in each case, as in numerous other instances, accuracy was finely indicated.

His two large meters at the Thames Tunnel have been in constant use day and night for upwards of twelve years (one continuation of dark hours), subjected to the wear and tear of 75 years, as compared with the ordinary hours of using gaslight above ground.

Gas Companies honouring Mr. Defries with their commands for his PATENT DRY METER, which has done so much service in simplifying the fitting up of gas, as well as checking surreptitious burning, will be guaranteed perfection for five years free of charge.

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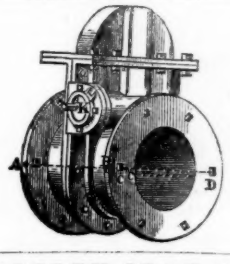

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keep always on stock their

IMPROVED GAS VALVES,

from 2 inches to 18 inches, price 11s. 6d. to 13s. 6d. per inch diameter.

List of prices, with full dimensions of all sizes up to 27 inches, to be had on application.

These Valves are all proved to 30 lbs. on the square inch before leaving the works.

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NEAR GRANGE ROAD, BERMONDSEY.

BIRTLEY IRON WORKS, CHESTER-LE-STREET, DURHAM.

Manufactory for every description of Casting and Machinery for Gas Works and Water Works.

Warehouse in London for Cast-iron Pipes and Connections of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Office in London, Mr. E. M. PERKINS, 78, Lombard Street.

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BEST CLASS-HOUSE POT AND CRUCIBLE CLAY.

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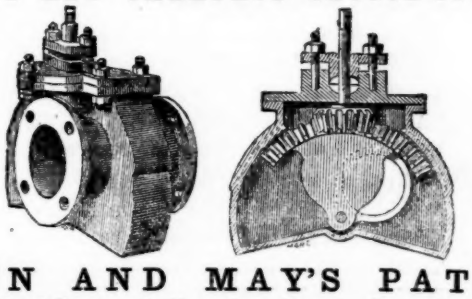
AMBLECOTE FIRE CLAY AND BRICK WORKS, STOURBRIDGE.

Late in the occupation of I. and W. King. Originally J. Pidcock, Esq.

BEST AND CHEAPEST SLUICE-COCK.



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Above 3-inch diameter, price 10s. per inch. Brass face, 6d. per inch extra.

Can be taken to pieces without being removed from the line of Piping.

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W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY,

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.

GAS OVENS IN SEGMENTS OF EQUAL QUALITY.

London Agents: CHADWICK and AKEROYD, Willington Stone Wharf, Regent's Park Basin.

A large stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all sizes kept in London at CHRISTIE & CO.—Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.

N.B.—*Export orders continue to have prompt attention.*

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GAS ENGINEER, MANUFACTURER OF GAS-METERS, GOVERNORS, AND EVERY DESCRIPTION OF GAS APPARATUS,
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CONSUMERS' METERS at the List Price, with a Liberal Discount to Wholesale Purchasers.
THOMPSON'S BROMINE TEST, £1. 1s.—BROMINE, 3s. per Ounce.
BISULPHURET OF CARBON TEST, £2. 2s.
APPARATUS FOR DETERMINING THE HEATING POWER OF SAMPLES OF COAL AND OTHER DESCRIPTIONS OF FUEL, £5. 5s.,
INVENTED BY LEWIS THOMPSON, ESQ., M.R.C.S.
REGISTERING PRESSURE GAUGE, Net Price, £8. Glass Shade, 10s. extra.
STATION METERS, PRESSURE GAUGES, PHOTOMETERS, SPECIFIC GRAVITY APPARATUS, &C.

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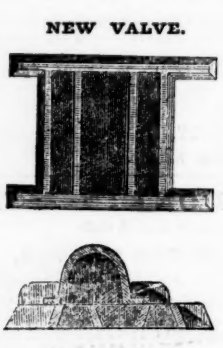
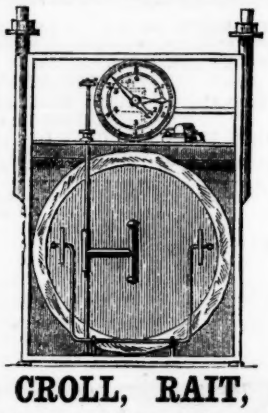
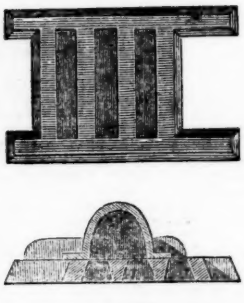
PATENT IMPROVED DRY GAS-METER,

NEW VALVE.





OLD VALVE.



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Messrs. CROLL, RAIT, and Co. having stated that the New Valve is an improvement to Mr. CROLL'S DRY GAS-METER, have much pleasure in supporting that statement by the opinion of practical men. They have authority to say that the following gentlemen, connected with the London Gas Companies, consider the alterations lately made, *especially those affecting the Valves*, to be important improvements therein.

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WILLIAM MANN, Engineer	„	City of London Gas Company.
ROBERT JONES, Engineer.	„	Commercial Gas Company.
HUNTER JONES, late Engineer	„	Equitable Gas Company.
JOSEPH CLARK, Engineer	„	Imperial Gas Company.
THOMAS KIRKHAM, Engineer . . .	„	
DAVID METHVEN, Engineer	„	
ROBERT LAING, Engineer and Secretary. .	„	Independent Gas Company.
RICHARD JONES, Engineer	„	London Gas Company.
WILLIAM INNES, Engineer	„	Phœnix Gas Company.
GEORGE WILTON, Resident Engineer . .	„	Ratcliff Gas Company.
THOMAS LIVESEY, Engineer and Secretary .	„	South Metropolitan Gas Company.
DAVID HUNTER, Jun., Resident Engineer .	„	Surrey Consumers' Gas Company.

This opinion is also confirmed by

JOHN KIRKHAM, Civil and Consulting Gas Engineer.
R. M. CHRISTIE „ „
THOMAS G. BARLOW „ „

D. HULETT and CO., 55 and 56, HIGH HOLBORN, LONDON,

PATENTEES and MANUFACTURERS of the ONLY GOOD MERCURIAL GAS REGULATOR,
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